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CONTENTS

THE WHOLE OF THE LITERARY MATTER IN THE LANCET IS COPYRIGHT

ORIGINAL ARTICLES

The Individual and the Group in Modern Medicine
Prof. R. J. V. PULVERTAFT, F.R.C.P. 839

Isoniazid in Pulmonary Tuberculosis
C. L. JOINER, M.R.C.P.
K. S. MACLEAN, M.R.C.P.
E. K. PRITCHARD, M.R.C.S.
KEVIN ANDERSON, M.D.
PATRICK COLLARD, M.R.C.P.
M. B. KING, M.D.
Prof. ROBERT KNOX, M.R.C.P. 843

Isoniazid in the Control of Experimental Corneal Tuberculosis
ROY GOULDING, M.B.
Prof. J. M. ROBSON, M.D.... 849

In-vitro Action of Isoniazid on *Mycobacterium tuberculosis*
Prof. ROBERT KNOX, M.R.C.P.
M. B. KING, M.D.
R. C. WOODROFFE 854

Titration of Strains of Tubercle Bacilli Against Isoniazid
D. A. MITCHISON, M.B..... 858

The Correct Physiological Basis on which to Compare Infant and Adult Renal Function
Prof. R. A. MCCANCE, F.R.C.P., F.R.S.
E. M. WIDDOWSON, D.SC.... 860

The Multilocular Cystic Tumour or Adamantinoma of the Jaw
E. D. D. DAVIS, F.R.C.S..... 862

Plasma-esterase and Plasma-lipase Levels in Nutritional Œdema Syndrome (Kwashiorkor)
P. R. SRINIVASAN, M.SC.
V. N. PATWARDHAN, PH.D... 864

MEDICAL SOCIETIES

Manchester Medical Society: Heart-disease and Pregnancy 866

NEW INVENTIONS

A Technique for Saving the Vein
R. P. ARONSON, M.R.C.P..... 867

REVIEWS OF BOOKS

Principles and Practice of Medicine 867

LEADING ARTICLES

ISONIAZID 869
MANAGEMENT OF DISSEMINATED SCLEROSIS 870
CONTROL OF FILARIASIS 872

ANNOTATIONS

Nobel Prize 873
Transpyloric Prolapse of the Gastric Mucosa 873
General Practice in Scotland.... 873
Saline Infusion..... 874
One Man's Meat..... 874
Porphobilinogen 875
Fifty Years of Midwifery 875
The Assistant Editor of The Lancet 875

SPECIAL ARTICLES

The Group Interview in the Selection of Medical Students
M. L. JOHNSON, PH.D..... 876
Filariasis in the Pacific..... 878

RECONSTRUCTION

Payment for Medicines in Australia
M. JOYCE DAMPNEY, M.A... 879

LETTERS TO THE EDITOR

Specialists and their Qualifications (Mr. David Patey, F.R.C.S.) 881
Future of the Occupational Health Services (Dr. T. A. Lloyd Davies; Dr. P. Pringle)..... 881
Recurrent Poliomyelitis (Prof. M. J. Fox, M.D.) 882
Addiction to Barbiturates (Dr. James Graham)..... 883
Overloading the Circulation (Dr. W. R. Murphy) 883
The Harrow Accident (Colonel J. W. Watkins) 883
Reaction to Procaine (Dr. R. M. Penny) 883
Bronchial Carcinoma (Mr. Geoffrey Flavell, F.R.C.S.)..... 884
The Emergency Obstetrical Service (Mr. Bryan Williams, F.R.C.O.G.) 884
Dark Adaptation for Screening (Dr. Alan Watson) 884
Pneuma, Psyche, and Soma (Dr. Lucius Nicholls) 884
Unsticking Syringes (Dr. J. H. Cort)..... 885
Red Cells in Animals (Mr. R. N. T.-W.-Fiennes, M.R.C.V.S.) 885
Withdrawal of Teaching (Dr. John Burton)..... 885
The Correct Spelling of Medical Terms (Dr. L. E. Napier)..... 885
Cure of Tobacco-smoking (Mrs. Edwards; Dr. Lennox Johnston; Dr. Wilfrid Joullié).... 886
First-aid Treatment for Nerve-gas Poisoning (Sir Harry Garner).. 886
Danckwerts Award (Dr. M. E. M. Herford) 886
Injection Routine in Operating-theatres (Dr. Lopes Soares)... 887
Thrombophlebitis Following Intravenous Infusions (Mr. J. F. Bolton Carter, F.R.C.S.) .. 887
Effects of Leucotomy (Mr. H. J. Eysenck, PH.D.) 887
Butazolidine (Dr. John Shulman) 887
Sublingual Heparin (Mr. E. G. Tomich, B.SC., Mrs. Woollett, B.SC.) 888
Antithyroid Action of P.A.S. (Dr. I. M. Librach) 888

IN ENGLAND NOW

A Running Commentary by Peripatetic Correspondents... 880

PARLIAMENT

Flogging for Crimes of Violence 888
Question Time 888

PUBLIC HEALTH

Shortage of Health Visitors..... 890
Examination of Coalminers..... 890
Statistics for England and Wales 890
Infective Hepatitis in the U.S.A. 890

OBITUARY

Wilfred Watkins-Pitchford..... 890

NOTES AND NEWS

Alchemy 891
University of Cambridge..... 893
Diary of the Week—Appointments 894
Births, Marriages, and Deaths... 891

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BIBLIOGRAPHY

*International Record of Medicine and General Practice Clinics *(1)* 164:674 (Nov.) 1951. *(2)* 164:675 (Nov.) 1951.

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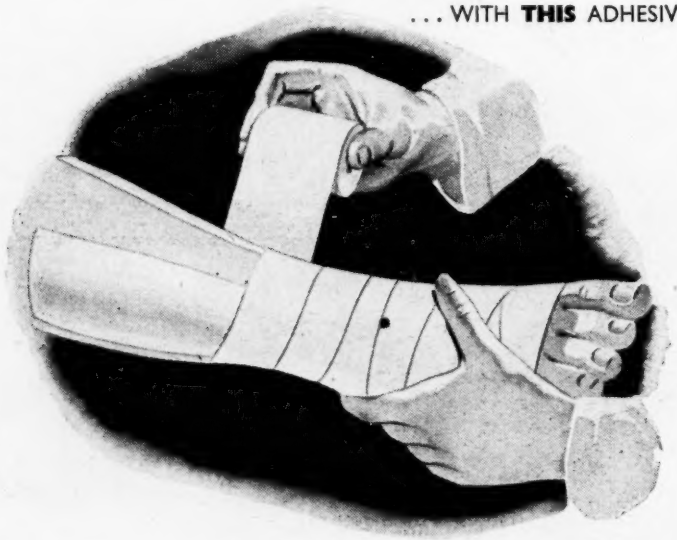

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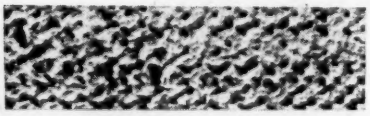

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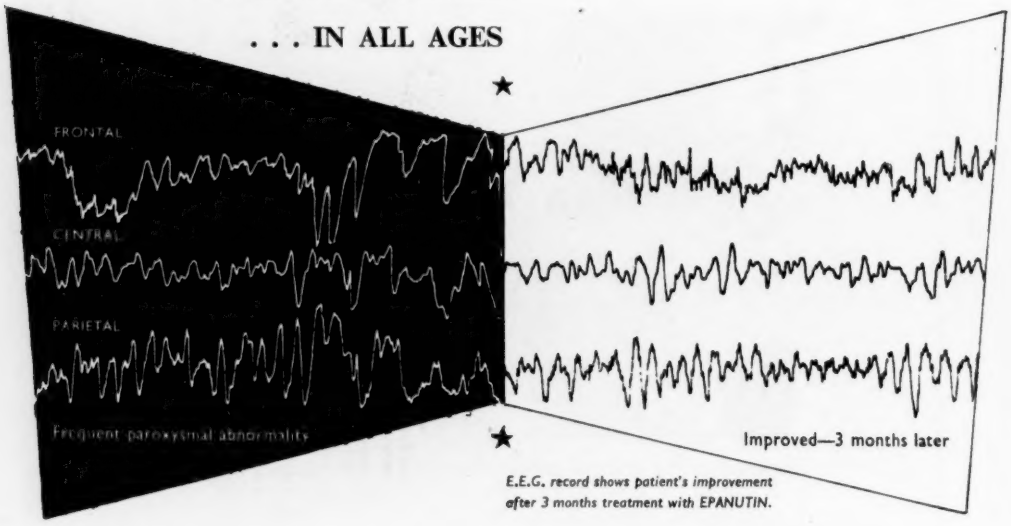

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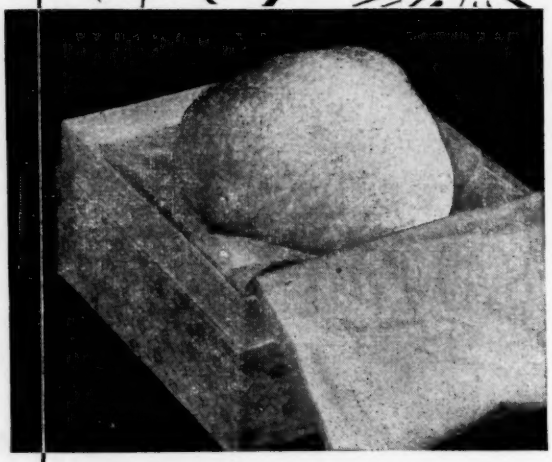

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THE INDIVIDUAL AND THE GROUP IN MODERN MEDICINE*

R. J. V. PULVERTAFT
O.B.E., M.D. Camb., F.R.C.P.
PROFESSOR OF CLINICAL PATHOLOGY IN THE UNIVERSITY OF LONDON, AT WESTMINSTER MEDICAL SCHOOL

LEAVING on one side the technicalities of clinical pathology, I propose to consider what influences are moulding our professional behaviour, and in what way we, as doctors, reflect the contemporary climate of thought. For no-one today can be a hermit; perhaps in no age has man been so assaulted by persuasion. Indeed, I might be excused were I to spend all the time at my disposal in deploring the wholly excessive amount of information and opinion that now inspissates the ether and reduces whole forests to wood-pulp and dismay. For the greater part of recorded time man has deplored disaster when it has occurred; it was left to this generation, in daily prodigality, to bewail in addition disaster to come.

But I shall resist the temptation and instead ask the question, "what is it that differentiates the age we live in from others before it?" The question answers itself; it is surely the search for an acceptable compromise between the individual—always essentially remote, unique, and rebellious—and the herd into which a contracting, overpopulated, and overelaborated world seeks to constrain him. This is, of course, the oldest problem of civilisation; but it has been posed in stark crudity today both by the division of the world into Russianism and Americanism, and by the often frenzied efforts of every country to contrive the maximum degree of order within its own confines while permitting, at least in some countries, the maximum degree of privacy and licence to the individual. The pendulum has swung far towards the development of impersonal and group values at the expense of private and individual ones; and both in medicine as a whole and in clinical pathology we are involved in this tendency. We can no more stand outside it as scientists than can the artist; just as the incoherent nausea of the '20s expressed itself in the fœtid poetry of those years, so we doctors of today sail, without even realising it, as the tempests of our time drive us.

It really is important, I think, for each of us to consider his attitude towards tendencies in our profession, and to express that attitude. The obligation to orientate or reorientate our activities is ours, and can be delegated to none.

In facing the world's troubles I note two popular evasions. The first is to find a simple paranoid explanation—such as that all evil is due to an international Jew-Banker conspiracy or an international antisemitic trust. The other is an equally fallacious confidence in the existence somewhere of a committee of first-class brains who, in spite of all appearances, are looking after things. I must admit that until quite recently I believed in that committee: until, in fact, advancing years forced committees upon me—when I found, to my horror, that committees, however egregious, were composed of puzzled asses like myself. Committees are necessary evils; but they are staffed largely by men too lazy, too old, or too inefficient to manage their own affairs, seeking in extenuation to manage those of others. Unlike an army, whose pace is that of the slowest man, a committee's intelligence is well *below* that of its stupidest member, who is often oneself. Occasional gleams of light flatter to deceive. I remember a committee man whose contributions were always startlingly different; but soon, alas, I realised that it was because he never, by any chance, was referring to the matter on the agenda.

Our world is not run by an international conspiracy or by a divinely wise committee: it is run by you and by me. And unless we pause now and again to see how we are running it, we may well find ourselves outrageously trimming our sails to inauspicious breezes.

SELECTION OF DOCTORS

In considering how far we have moved from private enterprise to impersonal patronage it is well to remember that a revolution has taken place in the method whereby our profession is recruited. In Eire today 95% of the medical students are supported by their parents or by themselves, and in my youth a similar condition obtained here. But in Great Britain at least 80% of medical students are supported by grants of some kind. I should be the last to deplore this, for I fancy that the tendency began after the 1914 war, when, with my contemporaries, I gratefully, if with some bewilderment, accepted my fellow citizens' benevolence. It is not surprising, however, that the opportunity of belonging without expense to the most lucrative profession outside the black market has attracted a flood of applications, far exceeding the vacancies in schools or the requirements of medicine. In one medical school male applicants for 30 vacancies numbered 540 last year; 120 women applied for 5 vacancies. (A great many, of course, applied to more than one school, and about 1 in 3 were eventually admitted somewhere.) This thirst to succour suffering humanity must make all but the cynic blush with pride; but even the most unsuspicious mind must wonder whether a method of medical recruitment which involves no personal sacrifice, still less hardship, for anyone attracts the right men and women. Moreover, it is well to remember that the dispensation of national patronage is vested in remarkably few hands. All these candidates come forward with very similar educational qualifications and the eulogies of pedagogues; a handful of deans, with or often without committees, bestows largesse and selects the doctors of tomorrow. For selection it is, and this selection is new. Twenty-five years ago, medical students could gain admittance at will to a medical school, almost always the first they chose. The very fabric of our profession is changed; it no longer selects itself; it has become to that extent anonymous.

ANONYMOUS SERVICE AND MASS MEDICINE

Anonymity, however, is not always, not necessarily vicious. If I seek an expression today of all that is best in the development of group interests, if I seek encouragement in this Freud-bespattered age for confidence in human decency, if I seek assurance that charity is not always imposed by the Welfare State on donor and recipient alike, I find it in fullest measure in the miracle of the blood-transfusion service. Was there ever so exquisitely anonymous, so touchingly charitable a manifestation of man's consciousness of his common interest and indebtedness? For all his conquests, frail man lies in his sickbed a mendicant; shall we not be proud that, in this country, and first and foremost in this country, he may beg of his brother's life-blood, and has never yet been refused? And that blood is given to king or criminal anonymously; none asks whence it came or whither it goes. It is through our hands, as clinical pathologists, that this kindliness finds its channel; last year over 500,000 calls were made on donors, and over 500,000 issues of blood were made; no thanks were sought, and none were given.

* Presidential address to the Association of Clinical Pathologists, delivered on Oct. 3, 1952.

If I select this service as the prime example of group consciousness and anonymity in medicine, it is only because it is so widespread and so peculiarly personal. I know well that in the vast sphere of medical research, for example, the same unambitious devotion is manifest; and indeed that in all medicine, in nursing, and in all ancillary branches, the lesson is to be learned that technique is kindliness, and kindliness a technique. We, the doctors, supported now largely by the State, are our fellow-man's expression of his kinsmanship with the Good Samaritan. We are the agents: the bequest was another's.

Indeed, the greatest services, viewed by results, are those which medicine gives broadcast—such services as control of the purity of water-supplies. To a very remarkable degree the health of every member of the community is protected by technique over which the individual has no control, and concerning which the majority are quite ignorant. The most rabid opponent of the bacterial theory of infectious disease is still forced to drink chlorinated water; pasteurisation of milk is imposed even on Christian Scientists. No-one but a crank would seek to restrict the control of infection in this way, or to oppose the hundred-and-one safety measures of the M.O.H. There are limits, however, to the extent to which men may properly be doctored in spite of themselves. A diet deficient in iodine might properly be adjusted by its addition; but can we extend this indefinitely to include, for example, fluorine? If, to push the question to absurdity, authorities supposed that we were becoming effeminate, could we approve the addition of testosterone to margarine as we already approve the addition of vitamins? Health authorities may rightly keep undesirable things out of food and water; how much may we legitimately put in?

We must never forget that opinions tend to change with regard to the harmlessness of materials. When I was working with resorcinol in connection with air sterilisation, I was assured that it might safely be used to sterilise the air of cinemas without the consent or even knowledge of the public; but we have since learnt that it is far from inactive in the human body. Insecticides are used more and more in control of insect life, yet they are not always without action on man. I would hazard a guess that sooner or later—so complex is the allergic state—some person will be found to react unfavourably to almost any substance, organic or inorganic. I am sure that health authorities are fully alive to these considerations; I merely restate an obvious truism that men should only be doctored at their own consent and that nothing should be administered universally until it is overwhelmingly and universally approved.

THE DOCTOR'S CONTRIBUTION

For the greater part of medical history doctors had little or no effect on vital statistics; it would have made no difference to the average survival of the people if there had been no doctors at all. That is not to say that the doctor had no function; in the relief of anxiety and pain, in prognosis and the ordering of men's lives, and above all as a support, however frail, in times of stress, he has had the same functions at all times as he has now. Moreover, it is by the study of disease through centuries barren of therapeutic discoveries that we today have so largely conquered acute and infectious disorders. But until the time of Pasteur and the triumphs of the laboratory the doctor was fortunate in not being paid by results: it was Pasteur who paved the surgeon's road from tradesmen's entrance to the House of Lords. If some lives were saved by the arrest of hæmorrhage and relief of asphyxia, how many others were lost by infection conveyed by surgeon and midwife?

Indeed, though medicine is often blamed for the overpopulation of the world, the enormous spurt in population began before doctors had any effective remedies, and was the direct result of the Industrial Revolution. The most overpopulated areas, such as Egypt, are the least doctored. On the other hand, in Western countries it does undoubtedly make a difference to the individual today whether or not he visits a doctor. The doctor now has more to offer than a bedside manner—which probably accounts for his modern sartorial insignificance. It is therefore inevitable that there should be an element of conflict between the doctor's sense of his duty to the community, in acquiring new knowledge, and to the individual, in facing that individual's personal and immediate emergency.

EXPERIMENT AND VOLUNTEERS

New knowledge in medicine must come by the scientific method of trial and error, by experiment. Much of that experiment can be carried out in test-tubes, with no victim more highly developed than bacteria, in whose interests no societies appeal. Much is carried out on animals, and this does pose an ethical problem which not all men answer alike. However, rightly or wrongly, we pathologists accept animal experiments as a necessary evil, realising that far too much of human choice is the selection of the lesser of two evils, and believing, selfishly enough, that relief of human pain is properly purchased at the expense of the animal.

But, sooner or later, knowledge must be applied to man, and need arises for experiment on man. I imply by the word "experiment" that the result of the doctor's intervention is not and cannot be assured, and that it may not be beneficial to the particular patient. Quite often it must be carried out on healthy men; we must ask for volunteers. When we do, let us be quite sure what we mean by volunteers. Obviously an infant or a child cannot be a volunteer, and this places a responsibility on the pædiatrician. In law, certain lunatics may be volunteers; for the law recognises the power of choice in certain aberrations of mind. In other classes of mental ailments all power of choice lapses and no question of volunteering remains. In other ages and countries experiments on persons of unsound mind have been performed, and published without reserve, but in this country and in this age such an approach would be intolerable. We must remember how recently, and not far away, the grossest excesses were perpetrated on sections of the community because an inebriated generation had conceived that that section was deprived of human privilege. We and they have awakened from that nightmare; but there is only one safe rule—no action of a doctor must have any other objective save the individual's personal welfare, without that individual's entire and competent approval. I have the most complete confidence, based on intimate and personal knowledge, in the integrity of the medical services of the Armed Forces in such matters; but, particularly now that service is compulsory for all, they must be prepared to resist any tendency to find a useful reservoir of clinical experiments in this group of healthy young men—especially since, in a disciplined force, the "volunteer" can easily be encouraged by sanctions or privileges. Similar considerations should influence us in approaches to undergraduates or medical students. No scientific doctor should ask another to "volunteer" for measures in which he does not share; and I must admit to the curiosity with which I always seek, in publications, for evidence that the writer satisfied his curiosity, in the first instance, on himself.

An extreme example of pharmacological assay may be offered as displaying methods today obsolete. Curare is now titrated by observing its power to destroy the tone of neck muscles in the rabbit; but its original discoverers were ignorant of this physiological action, and were

forced to alternatives. Elderly women were therefore collected and put in prison in a hut with the boiling drug; if they died the curare was accepted as being of optimal strength. This experiment has much in common with contemporary methods except that nowhere on earth would it be done in exactly that way.

Again, an experiment may be entirely legitimate at one stage in our knowledge, and as certainly unethical at another. In the early days of vaccination for smallpox, vaccinated patients were challenged by inoculating smallpox virus. This was, however, entirely proper since the experiment was performed at an institution founded to inoculate smallpox prophylactically; contemporary criticism would have been directed at the vaccination. The experiment failed in matters of detail and as scientists we should much like to repeat it today; but as doctors, indeed as civilised men, we are prevented. Indeed there are many routines in medicine, such as the use of rabies virus in prophylaxis, which are of very doubtful value; yet we can never test their validity since there is evidence (of a kind) of their efficiency.

As an example of an outmoded technique, we may recall that Alfred Donné attempted to establish the significance of vibrios in syphilitic ulcers by human experiment, injecting pus into one leg and pus treated with vinegar into the other. It is in fact remarkable how irresponsibly attempts were made at the end of the last century to produce venereal disease experimentally. Urethritis was produced with pure cultures of the gonococcus in both men and women by at least five separate workers. It is hard to believe that they were not aware of the implications both to the human beings infected and to their children. Human experiments with the cholera vibrio have been, so far as I know, in the best tradition of medical ethics; for von Pettenkofer and Emmerich used themselves for the test, and Emmerich contracted a severe attack of cholera. It is only fair to doctors as a whole to say that as a general rule they have submitted themselves to experiments which they have performed on others. I recall a distinguished laboratory chief who put not only himself but the whole laboratory staff out of action for a fortnight through an unfounded confidence in the nature of his test reagent.

It is right that we should cease to dwell on the horrors of the last war. War is a kind of intoxication, and nations, like men, must be evaluated when sober. I once met a lawyer who held office during the prosecution of Germans for war crimes, and asked him how a nation so renowned for its humanitarian services could have perpetrated such horrors. "There is only one step to take," he answered. "You may not think it possible to take it; but I assure you that men I thought decent men did take it. You have only to decide that one group of human beings have lost human rights."

How far medical experiments were performed on human beings in the late war will probably never be known, for many of the records are said to have been destroyed. Some evidence appears to be fully authenticated—for example, experiments at Buchenwald on typhus inoculations.

Ninety beds were set aside for experiments; and in the midst of extreme squalor and starvation these were maintained at the ordinarily high level of hospital amenity. Diet was liberal and nursing attentive.

A proportion of the patients volunteered for admission either as a deliberate method of suicide or as a desperate gamble which would at least ensure good food and comfort for a short time. Others were forcibly admitted as criminals or political prisoners. In all, just under one thousand persons were accepted as a study in experimental typhus fever contracted by intravenous inoculation with blood taken on the fifth day of the disease from other patients.

Germans are pedantically careful people. I have read the account of this experiment and as one who has seen this type of epidemic I have no idea why it was carried out, for it seems to have proved nothing not previously known about typhus. But it does prove that under quite extreme, and it may be hoped, unique conditions, human beings may treat each other as animals. We should not forget that he who condemns his brother condemns himself. There but for the Grace of God go we. That ghastly experiment will have had one good result if we only remember that it was in fact carried out.

CONTROL PATIENTS

In test-tube or animal experiments the control test presents no ethical problem. In fact we rack our brains in an attempt to ensure that every possible variant is kept constant save one; I remember a biologist at Cambridge who always recorded barometric pressure, although his experiments were usually on staining methods. But when we come to the human being, the dilemma of the control test is very real. If, for example, we study the cerebrospinal fluid in disease how are we to establish its state in health? If we remove a portion of liver—a procedure not without risk—in order to study hepatitis, with what norm shall it be contrasted? If we think we have discovered a useful treatment, are we justified in withholding it in selected cases and thereby perhaps risking life?

Many will remember that this is the central problem of the novel *Martin Arrowsmith*—perhaps the best fictional study of laboratory life ever written.

Actually, in the early stages of great discoveries the scarcity of the new agent supplies only too many controls. When penicillin reached us in the Middle East we had less than a million units to dispense, and the question was quite literally which of hundreds of dying men were to be selected for survival. A similar problem was treated dramatically by that talented bore Bernard Shaw in *The Doctor's Dilemma*; it is in very truth a fact that the choice between life and death is today in a pathologist's hand every time a new therapeutic agent emerges. The choice is not in practice difficult; for the least likely to survive are selected, thus satisfying both ethical and scientific requirements. One must admit to some concern at the fact that in Britain new discoveries from the dollar countries are often limited at first to those who can pay for them. But there is always a chance that they may be less harmless than is imagined, and in this case it is the rich who are the guineapigs.

I recall an occasion in the late war when a very limited amount of typhus vaccine was made available by the American manufacturers for civilian distribution during a typhus epidemic. My own view was that it should be given to armament-workers and other men of importance in the prosecution of the war; my American colleague insisted that it should be distributed without regard to age, sex, race, or occupation. He won; but as a result we were left in complete ignorance of its protective value; and I myself remain uncertain of its efficacy.

The use of antitoxic serum is still considered imperative in dangerous infections, such as diphtheria and tetanus, where antibiotics are of little value. Indeed to omit their use in a diagnosed case would evoke full medicolegal sanctions. No-one today, therefore, would dare to treat alternate cases with and without antitoxin; but when diphtheria antitoxin was first introduced, and none could surely predict its value, such an experiment was done. This was in my opinion quite legitimate and probably inevitable owing to shortage of supplies. In "Topley and Wilson" the results of this experiment rightly rank as some of the most important evidence for the value of antitoxin. Personally I should much like to repeat it for I am far from satisfied of its validity. But this would be quite impossible; antitoxin does little harm, if any; and to withhold it might be fatal.

The case of rabies is even more remarkable. Many persons bitten by rabid dogs do not get rabies; many who get antirabic treatment die of rabies none the less. But who dare refuse prophylaxis in a disease always fatal?

We are really faced with this problem every day. Medicine can never become fully scientific unless it becomes completely inhuman.

As clinical pathologists all our work, without exception, is a research. Slowly—often, I must admit, with exquisite boredom; often, I proudly claim, with the keenest intellectual pleasure—we collect accurate data from human sources. One objective must inspire our every action—that the interest of the patient must in some way be served by our intervention, unless it is explained to him, without possibility of misunderstanding, that we are seeking not his own welfare but the long-term welfare of humanity. I repeat that all research involves controls: by definition the test on the control cannot possibly be in that individual's immediate interest. It is true that in the ordinary man and woman there is a lordliness which will nearly always give generously of discomfort or even pain when asked to share with us the privilege of our voyage into the silent sea of knowledge. Our proud and angry dust has always found in self-sacrifice its challenge to a hostile universe. But what we may humbly ask we may not arrogantly demand; and I think that it is here that the conflict between our duty to the individual patient and to the whole sad host of human misery presents itself most clearly to the pathologist.

The possibility of transgressing this rule has been made more plausible not only by the increasing application of scientific methods to medicine but by two other factors—the independence of the doctor from private practice and the increase in academic appointments. So long as a doctor's pocket suffered by undue attention to herd interests, his scientific aspirations were held on a tight rein. As for academic appointments, it is difficult to wear any uniform without sooner or later feeling that one must live up to it. The Salvation Army lass reaches for her tambourine, the general for his sword (or perhaps in these days for his telephone), and the professor of medicine, surgery, or pathology for his fountain-pen. But let us not delude ourselves; the more we emphasise the academic aspects of medicine the more closely we must watch the interests of the individual patient.

EXTENSION OF LIFE

I have spoken of the doctor as the agent of his countrymen in the fulfilment of their philanthropic instincts. In these activities he is not given complete freedom. However much the pædiatrician may be tempted to practise infanticide it is forbidden; euthanasia may be advised, but it may not be instituted. In other cases what the law permits individual religions do not; contraception and sterilisation are examples.

There are some problems of great complexity on which neither State nor Church ventures to rule, but which the doctor must none the less face. At what price may extension of life legitimately be inflicted on a patient? Life is an incurable disease, as Oliver Wendell Holmes said, and always ends fatally; but is mere length of days, however dread the burden, to be sought? I have said that doctors are unfairly blamed for the overpopulation of the world; but the doctor must bear his share of blame for longevity, that second curse of mankind today. It is science as a whole which pleads guilty to overpopulating the world while underfeeding it; but medicine stands accused of making old age possible before making it endurable. In part I think a valetudinarian age must share the blame; the citizens of the second Elizabeth contrast strangely with those of the first, and life is a journey which nowadays many people finish with too much petrol in their tanks.

In no period has length of days been considered in itself a proper aspiration, and indeed the time when desire shall fail and the grasshopper be a burden is as much a reality as ever. I have often wondered what specialty Shakespeare would have chosen had he been a doctor of today. But certainly the author of *King Lear* would never have taken up geriatrics; and when I see what modern medicine does for the aged, I recall his words "O! let him pass; he hates him that would upon the rack of this tough world stretch him out longer."

The patient meets his doctor with a very wide mandate. He is anxious, and seeks peace of mind; he is in pain, and seeks relief; with the prospect of death, he asks reprieve. But the mandate goes further, and always there is in his mind the unspoken request: "Some time I must die. As a layman, I cannot tell the choice, if choice there be, of my path; but I trust your greater knowledge to see me through in the kindest way."

It is in the management of malignant disease that, to my mind, surgeons and radiotherapists of today are at times wrongly orientated. There is too much emphasis on the remote chance of "cure," too little on the mitigation of the reasonably certain course of the disease. There is some modern surgery which merely ensures that the patient's remaining days will be spent in convalescence from the operation. And there remains always the distressing fact that a patient or his relatives, faced on the one hand by an honest and correct statement that recovery is impossible and on the other by a statement that it may be ensured in certain especially skilled and expensive hands, will sometimes choose a road that is sadly against his interest. The final degradation of medicine is to become the blackmail of the dying with the fear of death.

THE ONLY SIGNIFICANT PROBLEM

During the last twenty-five years the laboratory has dominated medicine in the service of man. But this is only a temporary phase; at one time or another it has been given to physician, anæsthetist, or surgeon, or to the specialist in public health, to hold pride of place; and already the physicist is knocking at the door. (I refer, of course, not to the physicist as radiotherapist; it is the physicist in his exploration of the structure of living matter to whom the future belongs.)

Years ago I met in Jerusalem a very old and learned Jew, and complimented his race on its high proportion of great artists. "You are wrong to congratulate us," he replied. "The artist is always, in each age and race, an honoured guest. Our pride is in our welcome." It is in that spirit, I know, that we rejoice that our branch of medicine has in these last years had such high privilege.

But medicine, and above all scientific medicine, must never forget that in the ultimate analysis the only significant problem is the interest, both immediate and remote, of one frightened patient. Our vague but insistent feeling that humanity's problems are so vast that only vast generalisations can deal with them may lead us to forget that frightened unit. We have inherited a degree of trust more entire than that given to any other group of men—in these days we are trusted more than the priest. If we forfeit that trust by allowing the anonymity of our age to hide the unique personality of the patient, we may learn much and more quickly of the nature of disease, but we shall have lost a friend.

ISONIAZID IN PULMONARY TUBERCULOSIS

ITS USE WITH AND WITHOUT STREPTOMYCIN

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AFTER the synthesis of certain thiosemicarbazones and the demonstration of their antituberculous activity by Domagk et al. (1946) a number of similar compounds were made (Fox 1951) and tested against artificially induced tuberculosis in animals. Of these, isonicotinic acid hydrazide (isoniazid) was found to be effective against tuberculosis in mice (Grunberg and Schnitzer 1952) and subsequently in man (Robitzek et al. 1952). These workers wrote enthusiastically of its effects, and the echoes of their remarks reached the lay press in America and this country. A more cautious attitude was adopted by Elmendorf et al. (1952); but they, like the American Trudeau Society, recommended further clinical trials.

A large-scale trial has been conducted by the Medical Research Council which has recently published findings and conclusions after three months' observation (Medical Research Council 1952). The conclusion in this report is that "isoniazid is a very effective drug in pulmonary tuberculosis, but given alone it is not more effective than streptomycin plus P.A.S."

The investigations carried out at Guy's Hospital have fallen into three groups: (1) microbiological studies of the action of isoniazid in vitro (Knox et al. 1952); (2) studies of its efficiency in experimental tuberculosis (Goulding and Robson 1952); and (3) a clinical trial of its effectiveness alone and in combination with streptomycin in a small series of patients with pulmonary tuberculosis. The present paper gives the results of the clinical trial.

METHODS

Clinical trials with isonicotinic acid hydrazide both alone and in combination with other substances were started in March, 1952, and are still in progress. The investigation was made on outpatients who had been attending the Bermondsey and Southwark chest clinics. All patients were sputum-positive and had chronic fibrocaseous disease which in almost every case had been present for many years. Some had had chemotherapy at some stage in their illness, but the effects of this were judged to have ceased and only one instance of definite streptomycin resistance was discovered. Clinically the patients varied from the "good chronic" doing a part-time job who appeared to have achieved an unhappy symbiosis with the organism, to the toxæmic invalid in whom the disease was pursuing a slow but relentless downhill course. All patients attended Guy's Hospital once each week for clinical assessment (C. L. J. and K. S. M.). In addition they were weighed and blood was collected for erythrocyte-sedimentation rate (Westergren). Radiographs were taken before treatment and subsequently at intervals of three or six weeks. These were all examined by the same radiologist, who had no knowledge of what treatment was being given. Each patient submitted three early morning sputum samples each week, and kept a daily record of morning and evening temperatures with standard thermometers which were provided. Initially the plasma levels of isoniazid were measured; but when it was found that satisfactory levels were always achieved, this was discontinued. Similarly urine samples were collected before and after six weeks' treatment. No abnormalities were found; and this, too, was subsequently discontinued. A clinical umpire was appointed (E. K. P.) to whom any patient showing signs of deterioration was referred, and his decision about further treatment was accepted as final.

Bacteriological Methods

Sputum samples were sent to the laboratory in screw-top waxed cartons enclosed in stout envelopes bearing the patient's name. The macroscopic appearance of the specimen was recorded and the volume (scanty or copious) was noted. Films were made from the untreated sputum and stained by Ziehl-Neelsen's method, using malachite green as a counter-stain. These films were examined by one observer (P. J. C.) using a $^1/_9$-in. fluorite oil immersion objective. In each instance 100 fields were searched and the count was expressed as number of tubercle bacilli per 100 fields. All negative films were checked by another observer, and neither was aware which patients were receiving treatment. Thus no specimen was reported as negative microscopically unless 200 fields had been examined. Slides and record cards bore serial numbers only, as a further protection against recognition.

Culture.—Digestion of sputum was carried out by Jungmann and Gruschka's (1938) method. Particular attention was paid to the use of 10 vol. hydrogen peroxide as recommended in their original paper. Digesting fluid was run into each carton from a hooded burette and the mixture transferred to a wide-mouthed universal container for shaking and centrifugation. The deposit was neutralised with one 25 ml. wash with normal saline. Material from each container was inoculated on to three Lowenstein-Jensen slopes and incubated at 37°C for six weeks. Specimens from all patients were cultured thrice weekly for the first six weeks and thereafter, as far as possible, at intervals of three weeks. Cultures were examined at weekly intervals and the results entered on individual record cards. Where single colonies appeared, the numbers were noted as was the number of contaminated slopes. Subcultures were made in Dubos liquid medium for estimating the sensitivity of strains to isoniazid and streptomycin.

PRELIMINARY INVESTIGATION

As no controlled investigation had been reported on isoniazid in tuberculosis in man, a preliminary comparison was made between the effects of this substance and identical capsules containing lactose. 24 patients were selected and carefully paired in terms of age and duration, degree, and progression of disease. 1 of each pair received isoniazid (250 mg. daily in five 50 mg. capsules, one after each meal and two last thing at night, for six weeks) and the other the dummy capsules in the same way. The distribution was made in a random fashion and was unknown to the clinicians. 2 patients defaulted, both of whom were subsequently found to have been receiving lactose.

A clear difference was seen in the progress of the two subgroups, so that the clinical assessors made 19 correct predictions of treatment from the 22 remaining patients. Details of the observations made on the treated group are given later, but the weight changes in the two subgroups are compared in fig. 1.

The sputum from the patients in the treated group showed striking naked-eye and microscopic changes

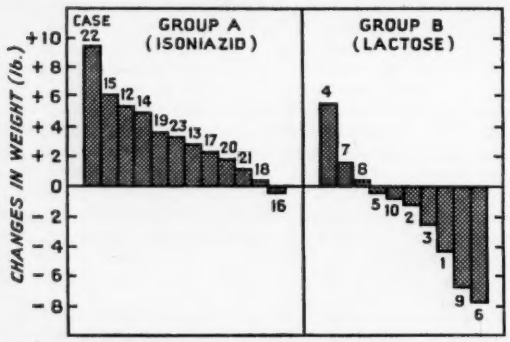

Fig. 1—Preliminary experiment to compare changes in weight in two groups of patients, one receiving isoniazid and the other identical capsules containing lactose for six weeks.

which are described more fully later. No such changes were seen in the control group.

During this period plasma levels of isoniazid were determined by the method of Rubin et al. (1952). Estimations made during the first three weeks of treatment showed levels between 2·0 and 0·79 μg. per ml. in the patients receiving the drug. As therapeutic concentrations were clearly being achieved on the dosage administered, further estimations were considered unnecessary.

THE MAIN TRIAL

This preliminary investigation showed clearly the effectiveness of isoniazid over a short period. It seemed important to investigate next whether this effect continued during longer periods of treatment and whether the drug was most effective alone or in combination with streptomycin. Accordingly, after the preliminary six weeks the patients who had so far served as controls, together with 1 newcomer, were given isoniazid in the same way, and also streptomycin 1 g. six days a week intramuscularly. The trial was conducted as before, and the results obtained during the first eighteen weeks of treatment in each group have been compared.

The Groups

Group A comprised 12 patients (3 women and 9 men), aged 25–49 years, who received 250 mg. isoniazid by mouth daily.

Group B comprised 11 patients (4 women and 7 men), aged 21–58 years, who received isoniazid in the same way, and also streptomycin sulphate 1 g. intramuscularly on six days of each week.

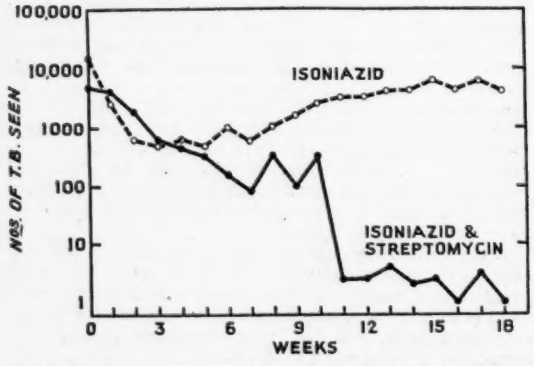

Fig. 2—Changes in excretion of tubercle bacilli in the sputum of patients in group A (isoniazid alone) and group B (isoniazid and streptomycin). (For explanation see text.)

Owing to an administrative difficulty, group B (with the exception of the newcomer) received isoniazid alone for the first of the eighteen weeks during which observations were made. Only on 11 occasions were weekly appointments missed, and when this occurred a mean value was taken from the readings obtained at the prior and subsequent attendances. As this was necessary only once in 40 values, it has been disregarded as a source of error.

Clinical Results

Between the first and the sixth week there was a striking clinical improvement in both groups. Attention is especially directed to the increased sense of well-being and better appetite which almost all patients enjoyed. The cough improved in a uniform way. It first decreased in frequency and severity, and then the sputum became less. Only 2 patients in group A and 4 in group B were pyrexial; and in 5 of these 6 patients the temperature was restored to normal. The remaining patient (in group B) had chronic bronchitis, which was thought to be causal. 2 other patients in group A who had previously had normal temperatures showed mild and transient pyrexial reactions for two and three days immediately after starting on isoniazid. No patient in either group noticed any increased frequency of hæmoptysis.

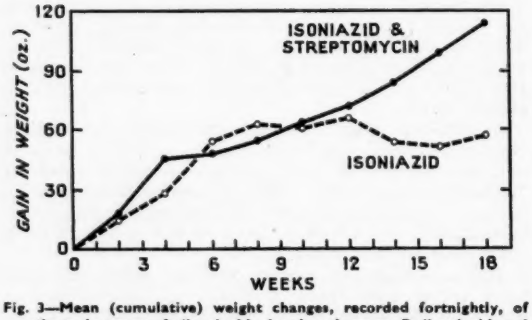

Fig. 3—Mean (cumulative) weight changes, recorded fortnightly, of patients in group A (isoniazid alone) and group B (isoniazid and streptomycin).

This improvement was maintained in group B throughout the eighteen weeks' observation period, and at the end of the course all the patients said that they had felt themselves improving progressively all the time. In group A, however, most of the patients said that they had noticed most improvement in the first half of the course, and 4 felt that they were relapsing during the last part. Another patient (fig. 7, no. 15) improved spectacularly until the eleventh week, and then relapsed so acutely that she had to be withdrawn from the trial at sixteen weeks.

Radiographs

At the end of eighteen weeks in group A 2 patients had improved and 2 were worse; 8 remained unchanged. In group B 4 had improved and 7 remained unchanged.

Sputum

Successive specimens of sputum from the patients in both groups showed at first a progressive change in macroscopic appearance. In addition to a decrease in volume the physical characteristics altered considerably. For example, some specimens changed from purulent to mucoid and finally became salivary, while others decreased strikingly in volume and their tenacious consistency resembled that of the sputum in acute lobar pneumonia. In later weeks, however, in the sputa of group A there was a progressive relapse in physical properties with a return to the original volume and purulent characteristics. In group B, on the other hand, the improvement was maintained.

WEIGHT CHANGES (IN OUNCES) IN GROUPS A AND B OVER EIGHTEEN WEEKS

Group A (isoniazid alone)				Group B (isoniazid plus streptomycin)			
Case no.	Period (weeks)			Case no.	Period (weeks)		
	0–6	6–12	12–18		0–6	6–12	12–18
12	+ 83	− 29	− 75	1	+ 63	+ 101	+ 73
13	+ 48	− 4	− 8	2	+ 37	− 19	+ 1
14	+ 80	+ 34	− 16	3	+ 55	− 23	− 29
15	+ 98	+ 37	− 187*	4	+ 45	+ 5	+ 69
16	− 5	− 18	+ 59	5	− 20	+ 28	+ 42
17	+ 35	− 6	− 35	6	+ 71	+ 88	+ 55
18	+ 3	− 19	+ 36	7	+ 32	+ 15	+ 14
19	+ 55	+ 4	− 18	8	+ 11	− 47	+ 69
20	+ 24	+ 23	+ 21	9	+ 158	+ 50	+ 97
21	+ 5	+ 39	+ 5	10	+ 42	+ 45	+ 46
22	+ 154	+ 111	+ 95	11	+ 17	+ 23	+ 22
23	+ 54	− 17	+ 16				
	Av. + 57	+ 13	− 9		+ 46	+ 23	+42

* Twelfth to sixteenth week only (withdrawn).

The bacillary count per 100 fields in three specimens from each patient was totalled to give an estimate of the weekly excretion of *Mycobacterium tuberculosis*, and the mean number per patient was plotted on a convenient scale against time in weeks. Fig. 2 gives the mean number of tubercle bacilli found per patient in the two groups. The transitory fall shown by group A is in striking contrast to the persistent fall shown by group B. Figs. 6 and 7 include the sputum-counts of individual patients. It was already clear by the third week of treatment that most cases in both groups were showing a striking fall in bacillary count. It can be seen, however, that in group A by the sixth week some patients were already showing an upward trend in their graphs. This occurred at the same time as the naked-eye relapse mentioned above and continued in later weeks. In group B, on the other hand, the initial fall in the sputum-count was maintained, apart from an occasional "flare-up," to the end of the eighteen-week period.

Culture of Myco. tuberculosis

All the patients in groups A and B supplied specimens of sputum in the pre-treatment period, except case 11. We do not propose to discuss the cultural results in detail here; but whereas in the pre-treatment period positive cultures were obtained without difficulty, in specimens from patients receiving isoniazid either alone or with streptomycin the proportion of successful isolations became less during the course of the trial.

For this and other reasons our information about the development of resistance in patients receiving chemotherapy is rather scanty. Cultures from 22 patients (12 from group A, 10 from group B) were tested for sensitivity to isoniazid and streptomycin at the start of the trial. All of these were sensitive to 0·1 μg. per ml. of isoniazid or less. Of the 22 cultures 1 was resistant to more than 10 μg. per ml. of streptomycin, 3 were sensitive to 1 μg. per ml., and the remainder were sensitive to 0·4 μg. per ml. or less. During treatment, in group A 2 out of 11 patients in the fourth week and 5 out of 6 patients in the tenth week had produced strains resistant to 0·1 μg. per ml. or more of isoniazid. Their resistance to streptomycin was unchanged. In group B in the fifth week 5 out of 5 patients produced cultures sensitive to 0·1 μg. per ml. of isoniazid and streptomycin.

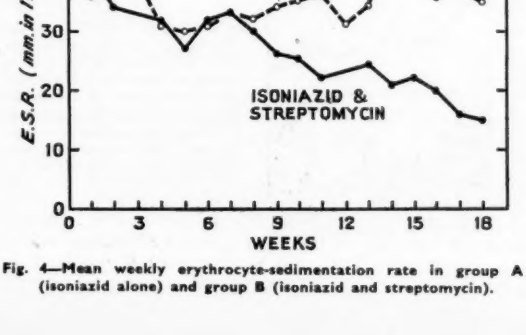

Fig. 4—Mean weekly erythrocyte-sedimentation rate in group A (isoniazid alone) and group B (isoniazid and streptomycin).

Weight

The weights were recorded weekly. Fig. 3 shows the average gain and loss in ounces of each group over each fortnightly period of the trial. This graph shows that whereas the isoniazid group failed to gain weight after the eighth week, the group treated with streptomycin in addition showed a steady gain throughout the whole period of the trial. Case 15, a patient who was losing weight rapidly and who was unfit to continue in the trial after the sixteenth week, is not included in the average for the final fortnight.

That the difference between groups A and B is not due to a very large change of weight in one or two cases is well shown by the accompanying table, which gives the weight change of all cases over the first, middle, and final six-weekly period of the trial. In the final period 3 cases in group A gained, and a similar number lost, 2 lb. or more; while in group B 7 gained, while none lost, this amount. This is in strong contrast to the initial period, where the two groups show a striking similarity, 8 patients in each gaining, and none losing, 2 lb. or more.

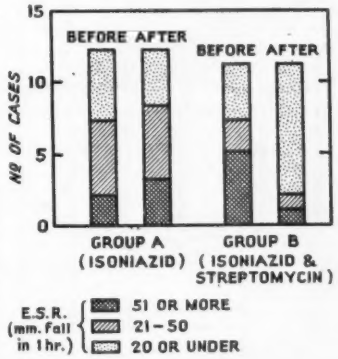

Fig. 5—Distribution of high, moderate, and low erythrocyte-sedimentation rates in the two groups before and after the trial.

The weekly weights of these 23 patients are shown graphically in figs. 6 and 7. In group A, case 22 gained weight rapidly throughout; case 15 gained weight rapidly at first, but in the last six weeks her weight fell precipitously and she was withdrawn from the trial; case 12 behaved similarly, but the fall was not quite so severe. Cultures from both these last 2 patients developed resistance to 10 μg./ml. of isoniazid at about the fifth week of treatment. In group B, the greatest gains in weight were shown by patients 1, 6, 9, and 10, all of whom were losing weight during the seven weeks before treatment started (fig. 1).

Erythrocyte-sedimentation Rate

Mean weekly values are shown in fig. 4. Case 15 was withdrawn at sixteen weeks. This figure shows that the value for the erythrocyte-sedimentation rate (E.S.R.) fell in both groups until the fifth week, after which this tendency ceased in group A. In group B it was maintained throughout the eighteen-week period.

That this difference is not accounted for by one or two cases showing very large changes in the sedimentation-rate is shown in fig. 5. Here the number of patients in each group having high (51 mm. +), moderate (21–50 mm.), and low (under 21 mm.) sedimentation-rates at the beginning and end of treatment is shown graphically. The weekly E.S.R. for each of the 23 patients is shown in figs. 6 and 7.

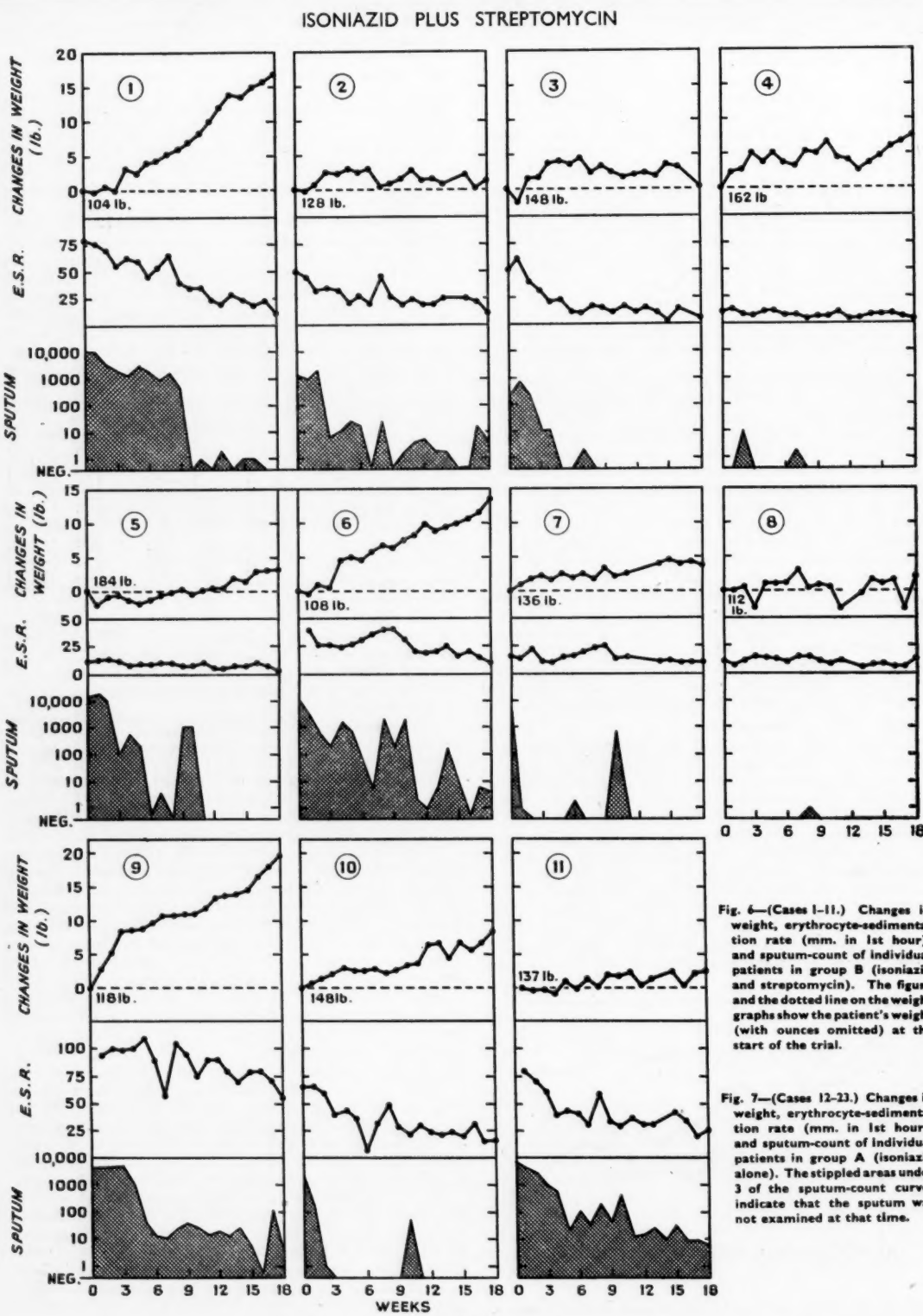

Fig. 6.

Fig. 6—(Cases 1–11.) Changes in weight, erythrocyte-sedimentation rate (mm. in 1st hour), and sputum-count of individual patients in group B (isoniazid and streptomycin). The figure and the dotted line on the weight graphs show the patient's weight (with ounces omitted) at the start of the trial.

Fig. 7—(Cases 12–23.) Changes in weight, erythrocyte-sedimentation rate (mm. in 1st hour), and sputum-count of individual patients in group A (isoniazid alone). The stippled areas under 3 of the sputum-count curves indicate that the sputum was not examined at that time.

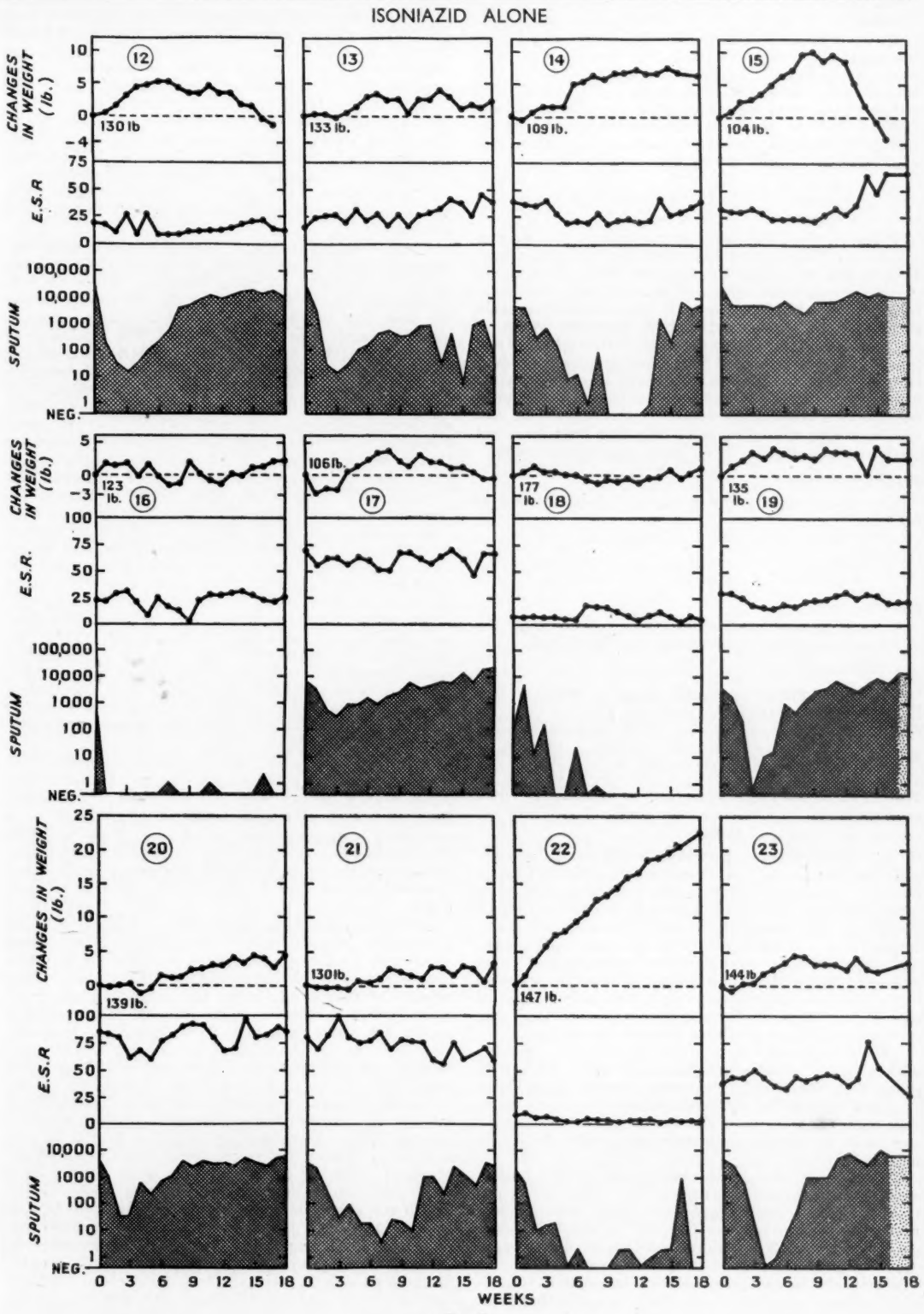
ISONIAZID ALONE
CHANGES IN WEIGHT (lb.)
E.S.R.
SPUTUM
NEG.
12
13
14
15
16
17
18
19
20
21
22
23
130 lb
133 lb.
109 lb.
104 lb.
123 lb.
106 lb.
177 lb.
135 lb.
139 lb.
130 lb.
147 lb.
144 lb.
0 3 6 9 12 15 18
WEEKS

Fig. 7.

Toxicity

No patient noticed any subjective toxic reaction to isoniazid. One observer (K. S. M.) thought that after about six weeks some hyperreflexia was present, and that it persisted throughout the course. In group B 3 patients developed rashes between the thirteenth and eighteenth week. In 1 case this was so severe that the dosage of streptomycin was reduced to 1 g. three times each week in the last two weeks.

COMPARISON WITH STREPTOMYCIN AND P.A.S. THERAPY

It seemed clear that patients on isoniazid plus streptomycin had fared better than those on isoniazid alone. It was now important to ascertain how this form of combined treatment compared with the well-tried combination of streptomycin plus *p*-aminosalicylic acid (P.A.S.). Two groups of paired patients—group C (9 patients given isoniazid and streptomycin) and group D (9 patients given streptomycin plus P.A.S. plus lactose)—were investigated. In group D, of the original 9 patients, 1 defaulted and in 1 treatment was stopped because of a reaction to streptomycin. That trial, and certain others, will be reported fully at a later date, but certain interim results, given below, appear pertinent.

Weight

The mean weight gains in groups C and D were as follows:

Group	*Weeks*	
	0–6	*6–12*
C (9 cases) ..	4 lb. 9 oz. ..	3 lb. 10 oz.
D (7 cases) ..	2 lb. 8 oz. ..	1 lb. 12 oz.

Sputum

In both groups the sputum-counts fell at about the same rate, and this improvement was maintained.

E.S.R.

The mean E.S.R. values (Westergren, mm. in first hour) were as follows:

Group	*Weeks' treatment*		
	0	*6*	*12*
C (9 cases)	61	28	21
D (7 cases)	75	37	28

The E.S.R. in both groups showed approximately equal improvement.

DISCUSSION

The number of cases reviewed in this report is small, and the results do not therefore lend themselves to detailed statistical analysis. Nevertheless, the data obtained from each case were considerable. Clinical assessment, erythrocyte-sedimentation rate, and body-weight were recorded weekly by the same physician; and specimens of sputum from each patient were examined twelve times each month, so that the criterion for a negative microscopic result was strict. In this way it was possible to compare very accurately the progress of patients receiving different treatment.

The investigation is only concerned with patients with chronic pulmonary tuberculosis corresponding to group 3 in the Medical Research Council (1952) trial. It might be expected that such patients would do worse than those with the more acute early pulmonary lesions, and that the problem of resistance would be at its maximum.

The patients were drawn from working-class homes, and all were treated as outpatients. Thus the conditions of the trial were those under which most patients with this type of disease have to be treated today. Great hopes had been entertained that isoniazid would prove of immense benefit in this type of case, and it was with a view to providing some information on this all-important question that this investigation was planned.

The method of pairing cases and including one of each pair in each group ensured that groups A and B contained very similar clinical material. Owing to the preliminary experiment during which group B received lactose capsules for a total period of seven weeks, we know that most of these patients were losing ground when treatment with isoniazid and streptomycin was started (see fig. 1). The rapid clinical improvement in pulmonary tuberculosis after administration of isoniazid is now well established. This effect was demonstrated conclusively during the initial period when group A received isoniazid and group B lactose capsules, and will not be discussed further here.

Comparison between the effect of isoniazid alone and isoniazid plus streptomycin over an eighteen-week period is, however, of great interest. While there is little difference in the progress of the two groups during the first half of the course, a great change becomes apparent after the twelfth week. The majority of patients receiving isoniazid alone deteriorated during the last six weeks of the course. This was shown by a return of tubercle bacilli in the sputum, cessation of weight gain, and in several cases weight loss; while the erythrocyte-sedimentation rate, which had in most instances undergone a moderate improvement, returned to the original level. Of 12 patients 5 realised that they were losing ground, but with 1 exception all thought they were better than before treatment. It was our impression that the subjective sense of well-being continued after the disease, as judged by sputum examination, erythrocyte-sedimentation rate, and weight change, had recrudesced to its former level. Mention must be made of case 15. This patient who was initially the most severely ill of the group made a spectacular improvement for eight weeks. Her temperature settled and she had put on over 9 lb. in weight. From the twelfth to the sixteenth week, however, the disease again became extremely active, her weight fell by 12 lb., and her temperature rose to a higher level than before treatment. On the other hand, all patients receiving streptomycin in addition to isoniazid improved steadily throughout the eighteen weeks.

A further series of 9 patients receiving isoniazid and streptomycin have now been followed to fourteen weeks. Again steady improvement has continued. This series (C) was not strictly comparable with group B as it contained a higher proportion of more toxic patients. The weight gain, while following the same steady increase throughout the fourteen weeks, was nearly double that observed in the first fourteen weeks in the group-B cases.

This discrepancy is of interest. Weight gain in tuberculous patients treated with isoniazid must depend upon two factors—namely, the increase in appetite consequent upon the disappearance of toxæmia, and the amount of food available for the patient to eat. Our patients had not access to the colossal diets available to the first cases described at the Sea View Hospital, New York, and so the weight increase tended to be more modest. Nevertheless, while it is possible that group C had slightly better home conditions than group B, the difference, if any, was small and cannot be held to explain the very pronounced variation between the two groups. The explanation probably lies in the greater toxicity in group C before treatment was started (E.S.R. average: group C 61 mm., group B 43 mm.). It is likely that patients in group C had suffered greater weight loss in the period immediately before treatment, and so gained weight at a greater speed when the toxæmia was removed. This emphasises the great importance of ensuring that groups to be compared should consist as far as possible of patients whose disease is in a similar state of activity as well as having comparable radiological appearances.

The remaining patients in group D, who have received streptomycin and P.A.S. for fourteen weeks, have shown a steady increase in weight although of very much smaller degree than was seen in group C. Nevertheless they have gained weight at almost as great a rate as group B. We consider that as they were extremely toxic at the beginning of treatment (E.S.R. average 75 mm.) the comparison with their paired group C is valid. Since groups C and D were both receiving the same dose of streptomycin, the results suggest that the greater increase of weight in group C was due to the isoniazid and thus indirectly support the conclusion reached in the Medical Research Council trial that isoniazid does cause an increase in weight not seen in patients treated with streptomycin and P.A.S. The improvement in the sputum and erythrocyte-sedimentation rates was of about the same order in groups C and D. The combination of isoniazid and streptomycin also has the advantage that patients find isoniazid easy to take, and it does not cause the nausea characteristic of P.A.S.; but larger series will have to be treated over a longer period before it can be certainly established that isoniazid plus streptomycin is in all respects the equal of P.A.S. plus streptomycin.

The important feature of this trial at the present time would seem to be the observation that most patients who receive isoniazid alone regress after a period of eight to ten weeks. This regression is associated with the development of isoniazid resistance. It is too early to be certain whether streptomycin prevents this resistance to isoniazid, or whether isoniazid acts like P.A.S. and the beneficial effect seen in the later weeks of an eighteen-week course of isoniazid and streptomycin is due to the fact that the tubercle bacilli remain sensitive to streptomycin.

These results suggest that the haphazard use of isoniazid alone in treatment of chronic pulmonary tuberculosis must be strongly condemned. There is a grave risk that the last state of patients treated with isoniazid alone may be worse than their first and that they will transmit isoniazid-resistant organisms to others. On the other hand there is no doubt at all that isoniazid, initially at least, hits the tubercle bacillus both in vitro and in vivo in a particularly vulnerable spot. It may be possible to find some modification of the molecule which will overcome its gravest disadvantage—the ease with which resistant strains develop. At present there is no doubt that this disadvantage can be greatly lessened by at least one form of combined therapy. While it may be that in time patients receiving streptomycin and isoniazid may become resistant to both before the sputum can be rendered permanently negative, this combination is apparently very effective and deserves much further trial.

CONCLUSIONS

Certain definite conclusions can be drawn from these results:

1. Isoniazid alone has a beneficial effect on certain cases of pulmonary tuberculosis in the first three to six weeks of treatment. In the next few weeks the initial improvement is no longer maintained; and soon deterioration ensues, especially at first in the sputum-counts. This deterioration is associated with the excretion of resistant strains of tubercle bacilli in the sputum.

2. Combined therapy with isoniazid and streptomycin, on the other hand, gives a completely different picture when continued for a long enough period. There is the same initial improvement as in the patients treated with isoniazid alone; but the improvement is maintained until at the end of eighteen weeks there is a great difference between the two groups. The initial rapid improvement in the sputum-counts, the gain in weight, and the fall in the erythrocyte-sedimentation rate all continue and there is paralleled improvement in the clinical condition.

We are indebted to Dr. B. J. Malley, chest physician, Bermondsey chest clinic, who allowed us to include some of the patients under his care, and Dr. E. V. Medill, who independently assessed the radiological changes. We should also like to thank Mr. D. E. Seymour, of Herts Pharmaceuticals Ltd., who kindly made available the supplies of isoniazid ('Pycazide') used in the trials. We should also like to thank Miss D. M. Read for her help in organising the clinical aspects of the trial, and Mr. J. A. Hughes and Mr. R. C. Woodroffe for their invaluable help in the laboratory. We should also like to acknowledge the secretarial and other help which we have received from members of the hospital staff and the Medical School of Guy's Hospital.

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ISONIAZID IN THE CONTROL OF EXPERIMENTAL CORNEAL TUBERCULOSIS

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IT has been shown that experimental corneal tuberculosis in both mice and rabbits provides the basis of a reliable and rapid in-vivo test by which the antituberculous activity of various chemotherapeutic substances may be assessed (Robson 1944, Gardiner et al. 1949, Rees and Robson 1950, 1951). Following the injection of a standard suspension of tubercle bacilli, the "cornea responds in a regular and predictable manner." The way in which the natural history of such artificially induced lesions may be modified by treatment of the animals reflects the antituberculous properties of the agents so employed. The results already obtained in this way with streptomycin, *p*-aminosalicylic acid (P.A.S.), and the thiosemicarbazones are, significantly, in accord with clinical observations.

The object of the present investigations has been to ascertain the effectiveness of isoniazid, either alone or in combination with other drugs, in the control of experimental tuberculous infections of the cornea. The opportunity has thus arisen to relate the behaviour in vivo to the properties in vitro as now reported (Knox, King, and Woodroffe 1952) and also possibly to provide experimental evidence in support of the combined drug therapy that has been tested in clinical practice (Joiner et al. 1952).

METHODS AND MATERIALS

The experiments here described fall into two groups. In those with mice the technique followed was that of Rees and Robson (1950) and in those with rabbits the procedure was that of Gardiner et al. (1949).

Mouse Experiments

Albino mice, each weighing approximately 25 g., were subjected to deep anæsthesia by means of bromvaletone and ether. Into one eye of each animal a

standard suspension of *Mycobacterium tuberculosis*, comprising about 1000 organisms in a 'Tween 80' medium, was then introduced. Cultures of both human (H37RV) and bovine strains were employed. The latter was supplied originally by Dr. W. M. Levinthal, of the Royal College of Physicians, Edinburgh. It has since been maintained by passage through the mouse, inoculation upon Dorset egg medium, and weekly subculture in Dubos medium containing 'Tween 80' and bovine albumin, up to a maximum of seven subcultures before return to a mouse. Seven-day cultures in the fluid medium formed the basis of the suspensions actually injected.

The developing lesions were subsequently observed at short intervals by the aid of a low-power binocular microscope. In the absence of treatment, the average incubation period is twelve days from inoculation. The corneal tubercles which then appear advance to a maximum at about thirty days, and thereafter undergo spontaneous partial regression until they are ultimately stabilised. In the present series, treatment was always initiated on the first day of the experiment and continued for a definitive period of twenty-eight days. During this time feeding was standardised, M.R.C. mouse diet 41 being offered at the rate of 5 g. per head per day. Initially, also, penicillin was given daily by subcutaneous injection with a view to limiting the secondary infection which occasionally occurred. Isoniazid and P.A.S. (as the sodium salt) were given in the diet, and the streptomycin (as the calcium chloride preparation) was administered daily by subcutaneous injection. The dosages were as follows: isoniazid 0·3 mg. per mouse per day (equivalent to about 12 mg. per kg. body-weight), streptomycin 4 mg. per mouse per day (equivalent to about 0·16 g. per kg. body-weight), and P.A.S. 2% of the sodium salt in the diet (equivalent to about 4 g. per kg. body-weight).

In each instance the course of the disease in the treated animals was compared with that in a control (untreated) group. Note was made of the incubation period, the extent of the lesion (by an arbitrary method of scoring), its rate of advance, and the number of animals involved. Thus a comparison could be made between treated and untreated animals week by week, either according to the percentage in each group protected from the disease or according to the average extent of the lesion in each group. Graphing such figures tended to emphasise any differences.

Rabbit Experiments

With the rabbits, deep anæsthesia was obtained by the use of ether alone and, this time, the standard amount of suspension of *Myco. tuberculosis* injected intracorneally into each eye contained only about 300 organisms. All animals were kept in individual cages and fed on the same diet. The corneæ were examined each week and the extent of the lesion was noted in each case. Again, an arbitrary method of scoring was applied. In the untreated rabbit, such experimental corneal tuberculosis has an incubation period of twelve to fourteen days. From this stage, when minute primary tubercles appear in the needle track, the disease steadily advances, eventually proceeding to panophthalmitis and, in about three months, to generalised tuberculous infection of the animal. The effectiveness of any antituberculous agent can therefore be judged by the degree and rate at which this normal course is modified by treatment.

In one experiment with rabbits treatment was started on the day of inoculation. To one group streptomycin (as the calcium chloride preparation) was given by subcutaneous injection, twice daily, at a dose equivalent to 100 mg. per kg. body-weight per day; and to another group isoniazid similarly at the rate of 10 mg. per kg. body-weight per day. Treatment was maintained for eight weeks in all. In the second experiment with rabbits, treatment was not initiated until moderately advanced lesions had already become established. Then, streptomycin was given to one group, isoniazid to the second, and the two drugs together to the third, in each case at the dosages already stated.

RESULTS

Mouse Experiments

Control of infections of Myco. tuberculosis (bovine strain) with isoniazid.—Two groups, each of 8 mice, were inoculated intracorneally with *Myco. tuberculosis* of bovine strain. One group served as a control and the other was given isoniazid in the diet. In the control animals the disease took its expected course, all but one being ultimately affected. In the treated animals, on the other hand, no lesions at all developed whilst treatment was maintained. Yet, fourteen days after cessation, characteristic lesions arose and followed a course almost identical with that in the controls. Again, most of the animals were eventually involved.

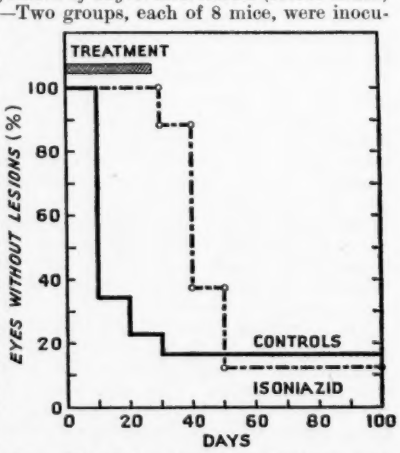

Fig. 1—The effect of isoniazid in protecting mice from experimental corneal tuberculosis (bovine strain); the incidence of the disease in untreated animals is shown for comparison.

Suppression during the course of treatment and recrudescence later are clearly shown in figs. 1 and 2,

Control of infections of Myco. tuberculosis (human strain. H37Rv) with isoniazid.—Repeating the experiment under similar conditions but using a culture of a virulent human strain of organisms there occurred, as expected, the customary lesions in the control group and, once again, a delay in the appearance of lesions in the other group until after treatment had been discontinued. This is demonstrated in figs. 3 and 4.

Significantly, perhaps, the subsequent breakdown was seen in fewer of the animals than in the previous experiment and the actual lesions were more limited.

Control of infections of Myco. tuberculosis (human strain, H37Rv) in which resistance to isoniazid had been developed in vitro.—By the kindness of Prof. Robert Knox, a culture of *Myco. tuberculosis* (H37RV) was provided in

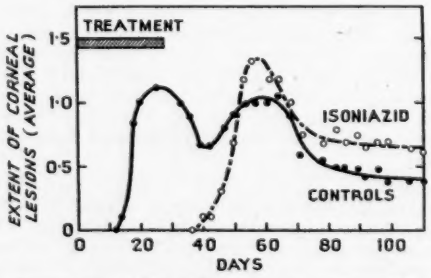

Fig. 2—Comparison of the development of experimental corneal tubercles (bovine strain) in untreated mice and in mice treated with isoniazid. The sizes of the lesions are expressed in arbitrary units, an average figure being given for each group.

which a high resistance to isoniazid had been developed in vitro by serial passage through media containing increasing concentrations of the drug (the inhibitory concentration in the test-tube was then 8–40 μg. per ml. instead of the usual 0·0128 μg. per ml.). A standardised suspension of such organisms was inoculated intracorneally into two groups, each comprising 11 mice. One group was then given isoniazid in the diet at the dosage already demonstrated as effective, while the other remained as controls. The development of lesions was then almost the same in the two groups—in time, extent, and quality (see fig. 5). Indeed, the drug had virtually no effect under these conditions—a result which has already been mentioned in a preliminary communication (Goulding et al 1952).

Control of infections of Myco. tuberculosis (bovine strain) by a combination of isoniazid and streptomycin.—Four groups, each of 15 mice, were given the usual intracorneal inoculation of *Myco. tuberculosis*, the culture being that of the bovine strain with a known sensitivity to both isoniazid and streptomycin. One group was left untreated as a control; the second received streptomycin, as described, by daily subcutaneous injections; the third was given isoniazid in the diet; and the fourth group received both drugs simultaneously. Among the controls, as expected, corneal lesions developed within two weeks of inoculation and pursued a characteristic course; all but 2 of the animals were ultimately involved. In those treated with streptomycin, the effect, as demonstrated by Rees and Robson (1950), was prolongation of the incubation period and some curtailment of the subsequent progress of the disease. With isoniazid alone the response was identical with that reported above—namely, complete suppression of the disease so long as treatment was maintained, and thereafter a relapse in which, apart from 3 animals, all exhibited lesions as seen in the controls. In the last group submitted to the combined therapy, however, not only was there complete absence of any disease during the twenty-eight days' course of treatment but, subsequently, a relapse occurred in only 4 of the animals and even then the lesions were both slow to arise and more limited in extent (see figs. 6 and 7).

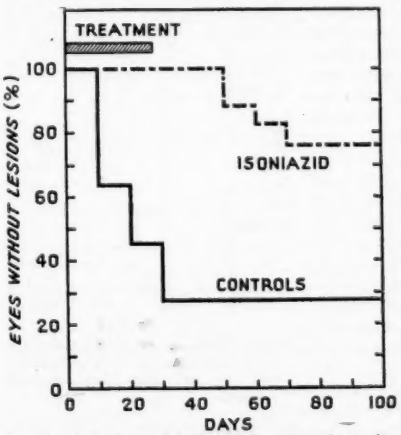

Fig. 3—The effect of isoniazid in protecting mice from experimental corneal tuberculosis (human strain H37Rv).

Control of infections of Myco. tuberculosis (bovine strain) with a combination of isoniazid and P.A.S.—In order to ascertain whether P.A.S. in combination with isoniazid would have a similar effect to streptomycin and isoniazid, yet another test was performed in mice with corneal infections of bovine *Myco. tuberculosis*. Again the controls followed a typical course. Moreover, whilst the combined drugs were administered in the doses quoted, no lesions appeared in the treated animals. Yet within three weeks of treatment being withheld the disease appeared in this group, involving, after altogether eight weeks' observation, 8 out of the 12 mice concerned. What is more, the lesions so arising advanced with that vigour generally seen in untreated animals (see figs. 8 and 9).

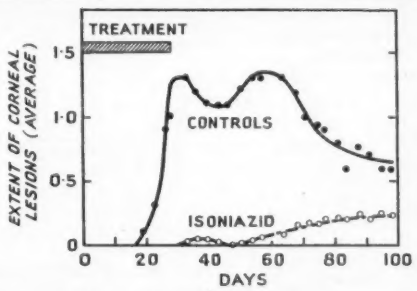

Fig. 4—Comparison of the development of experimental corneal tubercles (H37Rv) in untreated mice and in mice treated with isoniazid.

Rabbit Experiments

Acute lesions.—Of 10 adult rabbits on which bilateral corneal inoculation with *Myco. tuberculosis* (bovine strain) had been performed in accordance with the procedure outlined earlier in this paper, 2 were left untreated, while 4 were given streptomycin and 4 isoniazid in the dosages already specified. Treatment was started in each case on the day of infection. After two weeks, both the control animals bore incipient corneal lesions. These advanced steadily so that, by seventeen weeks, bilateral panophthalmitis was to be seen. The animals were accordingly sacrificed and at post-mortem examination generalised tuberculosis was found. Involvement of the lungs was gross and, indeed, in one of these rabbits radiographic evidence of pulmonary tuberculosis had been obtained five weeks previously. These findings conform to those of Gardiner et al. (1949).

By contrast, in those rabbits receiving streptomycin the onset of the lesions was delayed until almost four weeks had elapsed and, subsequently, the advance of the disease, though steady, was by no means as rapid as in the controls. Withholding treatment after eight weeks was not attended by any dramatic change.

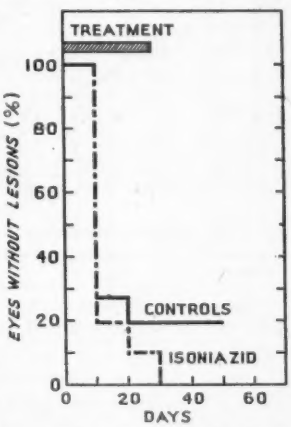

Fig. 5—The effect of using an isoniazid-resistant strain of *Myco. tuberculosis* H37Rv for inoculation of mice: the incidence of experimental corneal tuberculosis was virtually the same in both treated and untreated groups.

In the rabbits given isoniazid, on the other hand, the disease was completely suppressed throughout, all corneæ remaining clear, not only during the eight weeks of treatment but even afterwards as well. The total period of observation extended over eighteen weeks. (One animal in this group was found dead a week after the experiment began. At necropsy the lungs were collapsed and hæmorrhagic, and there was some sign of hæmorrhagic colitis.)

The distinct difference in the progress of the infection in the three groups is shown graphically in fig. 10.

Established lesions.—16 rabbits, with established corneal lesions of moderate severity from inoculation with *Myco. tuberculosis* (bovine strain) six weeks previously, were divided into three comparable groups, one being

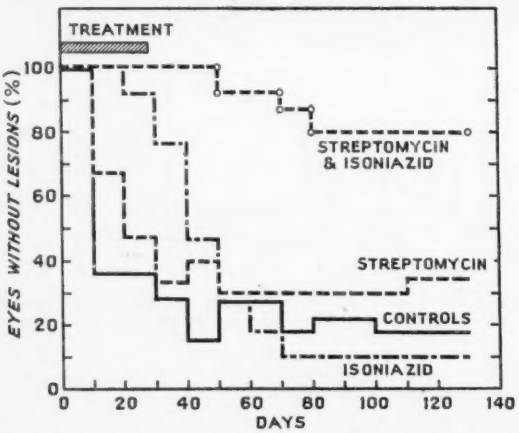

Fig. 6—Comparison of the effects of isoniazid, streptomycin, and a combination of the two in protecting mice from experimental corneal tuberculosis.

treated with streptomycin, the second with isoniazid, and the third with the two drugs together. Almost at once the lesions began to resolve and, after eight weeks of therapy, very little active disease could be seen on inspection. The corneæ were by no means clear, of course, for residual scarring remained prominent. Treatment was therefore stopped and in none of the animals was there any recrudescence in consequence. Moreover, the radiographs of the chests of these rabbits remained apparently clear.

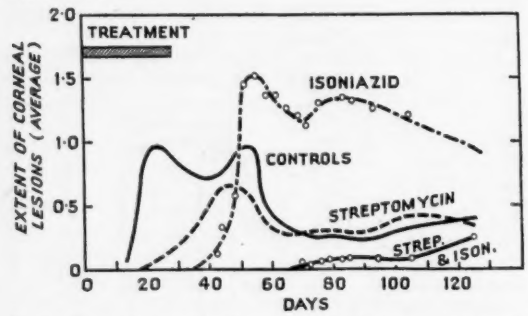

Fig. 7—Comparison of the effects of isoniazid, streptomycin, and a combination of the two on the development of experimental corneal tubercles.

Between the three methods of treatment no significant difference in response could be discerned at any stage (see fig. 11).

DISCUSSION

From these results it appears that, in mice, isoniazid by mouth in doses of the order of 12 mg. per kg. bodyweight controls experimentally induced corneal tuberculosis, at least so long as treatment is continued. Once treatment ceases, however, the infection is no longer restrained. The breakdown which ensues in the corneæ is more pronounced with the bovine than with the human strain of *Myco. tuberculosis*—a distinction that is in line with their relative sensitivities to isoniazid in vitro. Such behaviour suggests that this drug is essentially bacteriostatic rather than bactericidal. Furthermore, under the conditions of these experiments, its efficacy, at least during the period of administration, is greater than that of streptomycin, though the eventual restraint imposed on the infection may be rather less. In fact, the pattern of reactions with isoniazid tends to follow that with the thiosemicarbazones tested by the same technique (Rees and Robson 1951).

The fact that resistant strains do exist is once again of sinister import, for it is clear that against these isoniazid can have little success either in vitro or in vivo. Attention has been drawn to this aspect repeatedly since isoniazid was introduced as a chemotherapeutic agent. What then becomes most important in this context is the rapidity and frequency with which such organisms may arise in clinical practice. In the report of the Medical Research Council (1952) trial it is stated that, among a sample of isoniazid-treated patients, "after one month some 10% were resistant; after two months 50%; after three months 70%." Furthermore, "those who developed drug resistance fared, as a group, less well than the others" in the matter of clinical improvement. Again, in the trial by Joiner et al. (1952) those patients receiving isoniazid alone, after benefiting almost dramatically at the start, deteriorated after eight to ten weeks; and this regression, too, was associated with the emergence of isoniazid resistance.

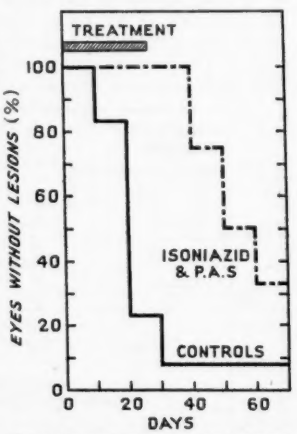

Fig. 8—The effect of isoniazid and P.A.S. in protecting mice from experimental corneal tuberculosis (bovine strain).

Data furnished by Knox et al. (1952) on the stability of the sensitivity end-point for human tubercle organisms grown in media containing isoniazid together with streptomycin or P.A.S. "suggest" that, in such circumstances, the development of resistance may be delayed. Moreover, a leading article in THE LANCET (1952) cited experiments in which a combination of streptomycin with isoniazid had delayed or averted bacterial resistance to both drugs in vitro. The suggestion was then made that "the effect of this combination in vivo should be investigated as quickly as possible," especially as large numbers of patients are already being subjected to such combined therapy. The way in which experimental corneal infections have reacted to combinations of isoniazid with other accepted antituberculous drugs may therefore be specially informative. With a streptomycin-P.A.S. régime there was complete inhibition of corneal tuberculosis in mice during the twenty-eight days of treatment; but within another twelve days all but 3 of 10 animals bore typical lesions (Rees and Robson 1951). When thiosemicarbazone (0·085% in the diet) was given along with streptomycin, the animals were not merely protected

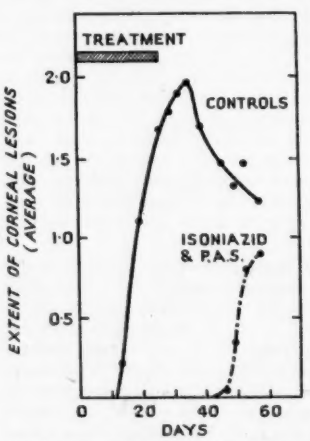

Fig. 9—Comparison of the development of experimental corneal tubercles (H37Rv) in untreated mice and in mice treated with isoniazid and P.A.S.

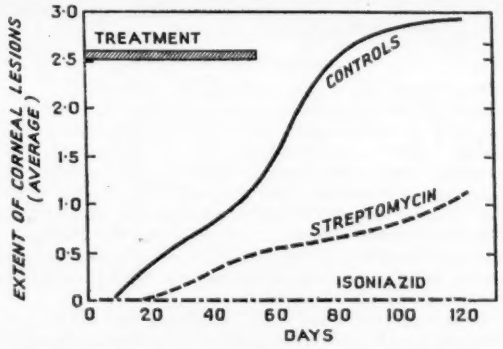

Fig. 10—Comparison of the development of corneal tubercles (bovine strain) in untreated rabbits and in rabbits treated with streptomycin and with isoniazid.

for the twenty-eight days when the two drugs were exhibited, but later, only 3 out of the 10 developed lesions during 128 days' observation. In the present series isoniazid and streptomycin gave results that were somewhat better than those with streptomycin and P.A.S., and more akin to those with streptomycin and thiosemicarbazone. Against this, isoniazid and P.A.S. together proved hardly more effective than the former drug alone.

If this technique does in fact afford some indication of the manner in which the various combinations may behave in the treatment of tuberculous patients, then the use of isoniazid in conjunction with streptomycin should be most promising—a possibility which has been at least provisionally confirmed by the results in the clinical trial now described by Joiner et al. (1952) and also the interim remarks in the report of the Medical Research Council (1952). Whether a similar combination of isoniazid and P.A.S. would prove as satisfactory in practice is, on the showing of our laboratory experiments, somewhat unlikely.

Finally, in rabbits, isoniazid showed itself more strongly antituberculous than streptomycin when used in the "umbrella" type of experiment; perhaps significantly, it so ablated the disease that there was no recrudescence after the drug was withdrawn. In this instance, therefore, it may well have behaved as a bactericide and not just as a bacteriostatic agent as on other occasions. This striking species difference between the rabbit and the mouse is difficult to explain. Normally, with corneal tuberculosis, the mouse exhibits the higher natural resistance. Yet, under the influence of isoniazid the rabbits in these experiments were completely protected. Perhaps the answer lies in the effect of temperature, to which Knox et al. (1952) have drawn particular attention. Though, as yet, corneal temperatures in the two species have not been accurately determined, nevertheless their body-temperatures, recorded rectally, show a striking difference; the average figure in the mouse is 34·3°C, and in the rabbit 38·3°C. It is interesting at this stage to speculate whether the startling responses to isoniazid by pyrexial patients can be attributed to an enhanced action of the drug where the higher temperature prevails.

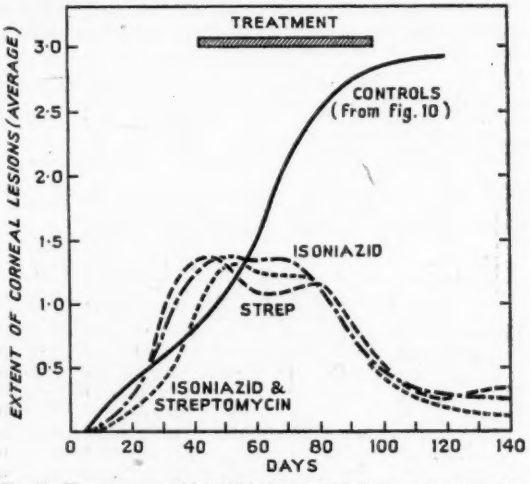

Fig. 11—The response of established corneal lesions to streptomycin, isoniazid, and a combination of the two. The control curve has been taken from fig. 10.

Against established lesions isoniazid alone by injection seemed just as potent as streptomycin or a combination of these two drugs. The prompt, uniform, and persistent response to all three modes of treatment in this experiment is in fact, surprising. That it was no more than a spontaneous regression might have been accepted had not previous and contemporary experience with controls shown that, in rabbits, experimentally induced tuberculosis of the cornea proceeds along a relentless course, so that in the end the animal is systemically afflicted.

SUMMARY

Methods are described for inducing experimental corneal tuberculosis in mice and rabbits and an account is given of the normal course of the disease in the two species.

The way in which such disease is modified by treatment reflects the antituberculous properties of the drugs employed, there being a parallel in this respect between experimental findings and clinical experience.

In mice, isoniazid alone had a suppressive effect on the tuberculous infection only while it was administered. Combined with P.A.S. it was very little more effective. When, however, the isoniazid was given along with streptomycin, the control of the disease, though not quite complete, was much more distinct.

In rabbits, isoniazid alone had a greater suppressive action than streptomycin. The difference between the two species is discussed and a possible explanation offered.

In vivo studies with isoniazid-resistant organisms are also reported.

We are grateful to the W. H. Ross Foundation (Scotland) for the Prevention of Blindness for further help in this research; to Mr. D. E. Seymour, of Herts Pharmaceuticals Ltd., for the supply of isoniazid used in these investigations; to Mr. R. W. Stanford, M.A., and Dr. John Vance, of the physics department, Guy's Hospital Medical School, who generously collaborated in the radiography of the rabbits; to Mr. P. A. Gardiner, who kindly examined the eyes in some of the rabbit experiments; and to Mr. P. Redgrave, who helped in the preparation of the figures reproduced in this article.

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IN-VITRO ACTION OF ISONIAZID ON MYCOBACTERIUM TUBERCULOSIS

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THE first reports about isoniazid and related substances (Fox 1951, Grunberg and Schnitzer 1952, Robitzek et al. 1952) made it clear that, whatever might be the final judgment on the value of these drugs in the treatment of tuberculosis, their highly effective and remarkably specific action on the tubercle bacillus demanded immediate study. Investigations of their in-vitro action were started at once in this laboratory, and this paper gives an outline of the experimental results obtained. Some of these merely confirm work already published, but we wish to emphasise a number of other observations which do not seem to have been recorded so far.

MATERIALS AND METHODS

Media.—For these investigations the fluid medium used was that described by Dubos and Middlebrook (1947) and was supplied by the Southern Group Laboratory, Lewisham. The basic medium containing 'Tween 80' was supplied in 100-ml. amounts, and 5% bovine albumin in 10 ml. amounts. Bovine albumin from several bottles was pooled and resterilised by filtration through a Seitz E.K. filter. For use, 4 ml. of this was added to each 100 ml. of Dubos base. Tube titrations were carried out in racks of 6 × 5/8 in. tubes plugged with cotton-wool and containing 4 ml. of the complete Dubos medium. Serial dilutions of the drugs (tenfold, fivefold, or doubling) were made in these tubes. For experiments that would last several weeks, the medium was stored in screw-capped containers to prevent evaporation.

Cultures.—Cultures of the H37RV strain of the human tubercle bacillus were grown at 37°C, usually for ten days, in screw-capped bottles containing 10 ml. of Dubos medium. One drop from such a culture was added from a Pasteur pipette to each tube of isoniazid-containing medium and to a control tube containing drug-free Dubos medium.

Stock solutions of isoniazid and streptomycin.—These drugs were made up in distilled water in a concentration of 1000 µg. per ml. The isoniazid solution was Seitz-filtered, but the streptomycin solution was made up and dispensed under sterile conditions; the two solutions were kept in 10 ml. amounts in screw-capped universal containers at 4°C. The preparation of isoniazid used in the bulk of this work was 'Pycazide,' supplied by Herts Pharmaceuticals Ltd., who report that it is 99·63% pure according to the method of Haugas and Mitchell (1952).

EXPERIMENTAL RESULTS

Measurement of In-vitro Activity of Isoniazid

Specificity of action.—Table I shows the effect of isoniazid in liquid media on human and bovine tubercle bacilli, other mycobacteria, and a number of other common micro-organisms. These results confirm the American observation that isoniazid has a highly potent and specific action on mycobacteria and especially on *Mycobacterium tuberculosis* (Pansy et al. 1952). A number of related substances have been tested for their action in vitro against mycobacteria, and they will be dealt with in a later paper.

Length of incubation.—In measuring the action of a drug on a slow-growing organism like *Myco. tuberculosis* obvious difficulties arise from the long incubation necessary before results can be read. Table II shows that at 37°C in Dubos liquid medium the end-point—i.e., the apparent sensitivity of *Myco. tuberculosis* to isoniazid—depended on the period of incubation. After incubation for from five to seven days (when growth could first be reliably recorded) the end-point was 0·01 to 0·002 µg. per ml. After longer periods of incubation the end-point progressively shifted until, after thirty-four days' incubation, growth occurred in the tube originally containing 1·6 µg. per ml. With streptomycin, on the other hand, the end-point was much more stable, and there was nothing like the same shift after prolonged incubation (see table II).

TABLE I—SENSITIVITY OF VARIOUS MICRO-ORGANISMS TO ISONIAZID

Micro-organism	Sensitivity (µg. per ml.)	Micro-organism	Sensitivity (µg. per ml.)
Myco. tuberculosis var. hominis	0·0128		
Myco. tuberculosis var. bovis	0·064		
Myco. smegmatis	1·6		
Myco. phlei	8·0	*Shigella flexneri*	
		Shigella sonnei	
Salmonella typhi	1000	*Bact. alkaligenes*	
S. typhimurium	1000	*Bact. coli*	> 1000
S. paratyphi A	1000	*Proteus vulgaris*	
S. paratyphi B	1000	*Ps. pyocyanea*	
Bact. aerogenes	1000	*Staph. pyogenes*	
Bact. friedländer	1000	*Strep. pyogenes*	
Proteus mirabilis	1000		
Proteus OX 19	1000		
Monilia albicans	1000		

The figures are for the lowest concentration which inhibited growth. Incubation: fourteen days for *Myco. tuberculosis*, twenty-four hours for other organisms, at 37°C.

TABLE II—SENSITIVITY OF H37RV TO ISONIAZID AND STREPTOMYCIN

Isoniazid

Days at 37°C	Concentration (µg. per ml.)										Control
	200	40	8	1·6	0·32	0·064	0·0128	0·002	0·0005	0·0001	
5–7	0	0	0	0	0	0	0	+	+	+	+
14	0	0	0	0	0	0	0	+	+	+	+
27	0	0	0	0	0	±	+	++	++	++	++
34	0	0	0	+	+	++	++	+++	+++	+++	+++

Streptomycin

Days at 37°C	Concentration (µg. per ml.)										Control
	200	40	8	1·6	0·32	0·064	0·0128	0·002	0·0005	0·0001	
5–7	0	0	0	0	+	+	+	+	+	+	+
14	0	0	0	0	++	++	++	++	++	++	++
27	0	0	0	+	++	++	++	++	++	++	++
34	0	0	0	++	+++	+++	+++	+++	+++	+++	+++

0 = absence of growth. + signs indicate approximate amounts of growth.

TABLE III—SENSITIVITY OF H37RV TO ISONIAZID AT DIFFERENT TEMPERATURES

Temperature of incubation °C	Weeks of incubation	Concentration of isoniazid (μg. per ml.)									Control
		200	40	8	1·6	0·32	0·064	0·0128	0·002	0·0005	0·0001	
35	1	0	0	0	0	0	0	0	0	0	0	+
	2	0	0	0	0	0	0	0	0	0	+	++
	3	0	0	0	0	0	0	0	+	+	++	++
	4	0	0	0	0	0	+	++	++	++	++	++
37	1	0	0	0	0	0	0	0	+	+	+	± ±
	2	0	0	0	0	0	0	0	++	++	++	+ +
	3	0	0	0	0	0	++	++	++	++	++	+ +
	4	0	0	0	0	+	++	++	++	++	++	++
40	1	0	0	0	0	0	0	0	tr.	tr.	tr.	+
	2	0	0	0	0	0	0	0	++	++	++	++
	3	0	0	0	0	0	0	0	++	++	++	++
	4	0	0	0	0	0	0	0	++	++	++	++

This shift in the end-point with isoniazid has been found consistently with cultures of *Myco. tuberculosis* whenever it has been looked for by prolonging the period of incubation. It has occurred not only with H37RV but also with strains freshly isolated from patients. In performing routine sensitivity tests on such strains it is therefore clearly necessary to use standard conditions of incubation, and we have found it most convenient in practice to read our results after an incubation period of fourteen days.

Inoculum size.—We have not investigated the effect of this very closely, but it appears that the sensitivity of *Myco. tuberculosis* to isoniazid is more dependent on inoculum size than is its sensitivity to streptomycin. In one experiment a seven-day-old culture of H37RV was used, both undiluted and diluted 1 in 10 with Dubos medium, to inoculate two rows of tubes containing fivefold dilutions of isoniazid. After fourteen days' incubation at 37°C the dilute inoculum appeared to be 25 times more sensitive than the heavy inoculum. When the same cultures were tested with streptomycin, no such difference was observed between the two inocula.

Temperature of incubation.—The sensitivity to isoniazid was tested in water baths at 35°, 37°, and 40°C, and in the incubator at 37°C. In the incubator and in the water bath at 37°C the sensitivity of *Myco. tuberculosis* was found, as before, to lie between 0·01 and 0·002 μg. per ml. At 35°C, however, the organisms seemed to be more sensitive, and after fourteen days' incubation growth was inhibited by as little as 0·0005 μg. per ml. At 40°C the sensitivity after fourteen days' incubation was the same as at 37°C—i.e., growth was inhibited in 0·01 μg. per ml. On further incubation the shift in the end-point described above took place at 35°C and at 37°C, *but not at 40°C* (see table III).

Effect of albumin.—It is known that the activity of many substances against *Myco. tuberculosis* can be affected by the presence or absence of albumin (Youmans and Youmans 1948). Steenken and Wolinsky (1952) found that the addition of serum somewhat increased the sensitivity of cultures of *Myco. tuberculosis* H37RV to isoniazid. In our experiments using fivefold dilutions, we have usually found no significant difference in sensitivity with or without albumin. This is in marked contrast to our results with *p*-aminosalicylic acid (P.A.S.).

Effect of Streptomycin and P.A.S. on Sensitivity to Isoniazid

Streptomycin.—In a number of experiments various combinations of isoniazid and streptomycin were tested for their effect on the growth of H37RV. It was found that the shift in the end-point which was observed with isoniazid alone did not occur to anything like the same extent in the presence of concentrations of streptomycin which by themselves were not inhibitory. Part of one such experiment is illustrated in table IV.

P.A.S.—In the absence of albumin, P.A.S. strongly inhibited the growth of *Myco. tuberculosis*, either alone or in the presence of isoniazid; but, in the presence of albumin, P.A.S. alone was relatively inefficient, for it failed to suppress growth completely even in a concentration as high as 200 μg. per ml. and it gave no sharp end-point. It was interesting, therefore, to find that, in the presence of albumin, as little as 0·32 μg. per ml. of P.A.S. prevented, over a period of five weeks, the shift in the end-point to isoniazid which occurred in the same medium containing isoniazid alone (see table V).

Inactivation of Isoniazid in Uninoculated Media

We have found that in aqueous solution isoniazid withstands autoclaving at a pressure of 10 lb. per sq. in. for 10 minutes without apparent loss of activity (see table VI).

The stability of isoniazid in Dubos medium was studied by incubating solutions containing 4 μg. per ml. of isoniazid in distilled water and in Dubos medium under sterile conditions at 37°C for four weeks. At the start of this experiment and at the end of each week a sample of each isoniazid solution was tested for its drug content. Doubling dilutions in fresh Dubos medium were made, inoculated with a ten-day-old culture of H37RV, and incubated at 37° C for seven days. The highest dilution of the drug in which growth was inhibited was then recorded. Table VI shows that in distilled water the highest dilution producing inhibition of the test organism remained constant, even though the drug had been incubated for varying periods before the assay. In Dubos medium, on the other hand, the inhibitory dilution altered with each subsequent assay. As the test organism used for each weekly assay was of known and

TABLE IV—THE EFFECT OF STREPTOMYCIN ON THE SENSITIVITY OF H37RV TO ISONIAZID

Isoniazid in the presence of streptomycin 0·05 μg. per ml.

Weeks at 37°C	Concentration of isoniazid (μg. per ml.)										Control
	8	1·6	0·8	0·4	0·2	0·1	0·05	0·025	0·012	0·006	
1	0	0	0	0	0	0	0	0	0	0	+
2	0	0	0	0	0	0	0	0	tr.	++	++
3	0	0	0	0	0	0	0	0	++	++	++
4	0	0	0	0	0	0	0	tr.	++	++	++
5	0	0	0	0	0	0	0	++	++	++	++

Isoniazid alone

Weeks at 37°C	Concentration of isoniazid (μg. per ml.)										Control
	8	1·6	0·8	0·4	0·2	0·1	0·05	0·025	0·012	0·006	
1	0	0	0	0	0	0	0	0	0	0	+
2	0	0	0	0	0	0	0	0	++	++	++
3	0	0	0	0	0	0	tr.	++	++	++	++
4	0	0	0	0	0	0	++	++	++	++	++
5	0	0	0	0	±	++	++	++	++	++	++

In the streptomycin control in this experiment, the inhibitory concentration was found to be 0·1 μg. per ml.

TABLE V—THE EFFECT OF P.A.S. ON THE SENSITIVITY OF H37Rv TO ISONIAZID (IN THE PRESENCE OF BOVINE ALBUMIN)

Isoniazid in the presence of P.A.S. 0·32 µg. per ml.

Weeks at 37°C	Concentration of isoniazid (µg. per ml.)						Control
	10	1	0·1	0·01	0·001	0·0001	
1	0	0	0	±	+	+	+
2	0	0	0	±	++	++	++
3	0	0	0	±	++	++	++
4	0	0	0	+	++	++	++
5	0	0	0	++	++	++	++

Isoniazid alone

Weeks at 37°C	Concentration of isoniazid (ûg. per ml.)						Control
	10	1	0·1	0·01	0·001	0·0001	
1	0	0	0	+	+	+	+
2	0	0	0	++	++	++	++
3	0	0	0	++	++	++	++
4	0	0	++	++	++	++	++
5	0	++	++	++	++	++	++

In the P.A.S. control, some inhibition of growth occurred in 40 µg. per ml. (see text).

constant sensitivity, any apparent loss of sensitivity of that organism each week was clearly due to progressive decay in the activity of the drug resulting from previous incubation in the uninoculated medium. In table VI the drug content at the end of the first assay is given as 100%, but it is clear that even during the period of this and later assays inactivation of the drug must take place.

Further experiments are being done to determine the constituents responsible for this inactivation of the drug in uninoculated media. The following facts can be mentioned at this stage:

(1) Inactivation in uninoculated media increased as the temperature was raised from 32° to 42°C (see table VII).

(2) The inactivation of the drug in uninoculated media was not prevented by the addition of streptomycin.

Development of Resistance to Isoniazid in H37Rv

The experiments that have been described show that inactivation of the drug undoubtedly does occur in the absence of any organisms. Although this accounts for part of the shift in the end-point on prolonged incubation of inoculated media, it does not account for all of it. When this shift in the end-point was first noticed, it was thought to be due entirely to the presence in the bacterial population of large numbers of isoniazid-resistant strains which were being selected in the higher concentrations of the drug. An attempt was made to breed out these isoniazid-resistant strains to test: (1) the ease with which they could be produced; (2) their permanence; and (3) their resistance to streptomycin.

Production of resistant strains.—As described in a preliminary communication (Goulding, King, Knox, and Robson 1952), a culture of the H37Rv strain was inoculated into a series of tubes of Dubos liquid medium, containing falling dilutions of isoniazid. During the first two weeks of incubation, growth was inhibited by a level of 0·01 µg. per ml., but after twenty-five days there was profuse growth in the tube which had contained initially 1·6 µg. per ml. From this tube one drop of culture was inoculated into a fresh set of drug dilutions in Dubos medium. In this series, the organisms grew within a week in dilutions up to 0·32 µg. per ml. and then to 1·6 µg. per ml. When further subculture was made from this tube into a fresh set of dilutions, growth was rapid in concentrations of isoniazid as high as 25 µg. per ml. Finally, on subculture from this tube after only ten days' incubation in fresh Dubos medium containing isoniazid, good growth occurred after only seven days' incubation in 62·5 µg. per ml. of the drug. The organisms therefore were now about 6000 times more resistant than in the original culture. This strain was subcultured into drug-free medium and retested for its sensitivity to isoniazid; this was found to lie between 8 and 40 µg. per ml. In similar experiments we obtained, from the original culture of H37Rv, cultures which grew in 31·25 µg. per ml., but which failed to grow in 62·5 µg. per ml. of isoniazid. On more than one occasion we have observed lysis of the growth in tubes containing these high concentrations of isoniazid, but this has appeared irregularly.

We have found it possible to isolate isoniazid-resistant strains more easily than streptomycin-resistant strains, though the degree of resistance finally obtained with streptomycin has been greater than with isoniazid. In the case of streptomycin we have been able to obtain a strain resistant to 4000 µg. per ml., whereas the highest degree of resistance that we have so far obtained with isoniazid has been of the order of 62·5–125 µg. per ml.

Permanence of resistance.—The isoniazid resistant strain obtained by the method described above was subcultured into drug-free medium at regular intervals of fourteen days, and at each subculture its sensitivity was retested. After the sixth transfer, the isoniazid sensitivity was unchanged, and lay between 8 and 40 µg. per ml.

Development of Resistance to Isoniazid in Freshly Isolated Strains

We have also investigated the development of resistance to isoniazid in strains freshly isolated from patients. The development of resistance in patients has already been reported by several workers (Steenken et al. 1952, Goulding, King, Knox, and Robson 1952), and is now described briefly by Joiner et al. (1952). We have also found that sensitive strains freshly isolated from patients can be trained in vitro to become resistant in the same way as can the H37Rv strain.

TABLE VI—DESTRUCTION OF ISONIAZID IN UNINOCULATED MEDIA AT 37°C

Weeks of incubation at 37°C before assay	Medium			
	Distilled water		Dubos medium	
	Highest dilution inhibiting growth (µg. per ml.)	Drug remaining (%)	Highest dilution inhibiting growth (µg. per ml.)	Drug remaining (%)
1	0·015	100	0·015	100
2	0·015	100	0·031	50
3	0·015	100	0·062	25
4	0·015	100	0·125	12·5

Initial concentration of isoniazid in each medium: 4 µg. per ml. (see text).

TABLE VII—DESTRUCTION OF ISONIAZID AT DIFFERENT TEMPERATURES IN UNINOCULATED MEDIUM

Weeks of incubation at each temperature before assay	Temperature of incubation					
	32°C		37°C		42°C	
	Highest dilution inhibiting growth (µg. per ml.)	Drug remaining (%)	Highest dilution inhibiting growth (µg. per ml.)	Drug remaining (%)	Highest dilution inhibiting growth (µg. per ml.)	Drug remaining (%)
1	0·031	100	0·031	100	0·031	100
2	0·031	100	0·062	50	0·250	12·5
3	0·125	25	0·250	12·5	0·5	6·2
4	0·250	12·5	0·50	6·2	2·0	1·5

Initial concentration of drug at each temperature: 4 µg. per ml. (see text).

DISCUSSION

Our results fully confirm the American reports that isoniazid has a powerful inhibitory effect on the tubercle bacillus. The drug initially inhibits the growth both of the H37Rv strain of tubercle bacillus and of strains freshly isolated from patients in very low concentrations (about 0·01 µg. per ml. or less). Its activity against the tubercle bacillus is of at least the same order as that of penicillin against the Oxford staphylococcus. With a molecular weight of 137, it is initially about 8–10 times more efficient against the tubercle bacillus than streptomycin (molecular weight 579) when compared in equivalent molecular concentrations, and 30–40 times more efficient when compared on a weight-for-weight basis.

Its low molecular weight, its ready solubility in water, its low toxicity, and the ease with which it is absorbed by mouth are all properties highly desirable in a drug. But its most remarkable property is its specificity. So far as is known it acts almost uniquely against mycobacteria; and within the mycobacteria its efficiency is greatest against the pathogenic members, especially the human tubercle bacillus.

For these reasons, then, quite apart from the hopes that it raises of widening the limited field in the chemotherapy of tuberculosis, the drug offers intriguing problems to both clinician and microbiologist. It became obvious at once that its success in the treatment of the disease would hinge on the ease with which resistant strains developed in patients receiving the drug. It is now well known that resistant strains develop rather rapidly in laboratory cultures (Middlebrook 1952, Hobby and Lenert 1952, Knox, Maclean, and Robson 1952) and in patients (Steenken et al. 1952, Goulding et al. 1952).

In this connection the phenomenon of the shift in the end-point and the "escape" from the effects of the drug shown in vitro by cultures of *Myco. tuberculosis* would seem to be of some importance. Some shift in the end-point has been mentioned by Hobby and Lenert (1952) and Aitoff (1952); but its possible extent and importance do not seem to have been appreciated. We know that two processes may be involved in this phenomenon: (1) a steady inactivation of the drug, occurring in uninoculated media during prolonged incubation (table II); and (2) the development of resistant variants, which can be obtained without much difficulty by appropriate methods of subculture. If the first process alone were to account for the shift in the end-point we should have to suppose that the drug was bacteriostatic and not bactericidal, that the inoculated organisms lay dormant but alive until such time as the drug concentration fell below the critical level, and that the organisms which finally grew out consisted of the original inoculum of sensitive cells. On the other hand, the second process could account for the phenomenon if nearly all the cells in the original inoculum were killed and if the growth which finally occurred were due to the multiplication of a small number of highly resistant cells in the original inoculum. The truth almost certainly lies somewhere between these two extremes.

To decide whether a drug is bactericidal or bacteriostatic is not always easy (Klarmann 1950). To some extent, it is a matter of degree. An organism exposed to an inhibitory agent for long enough will die of inanition. If removed from the influence of the drug after only a short exposure the bacterial cell may recover and, in a suitable medium, start growing again; but after long exposure it may have suffered irreversible damage and so fail to multiply even in an optimal medium.

It is still too early to say much about the way in which isoniazid acts—whether its action is mainly bactericidal or bacteriostatic, with what frequency resistant variants develop, and how their development can be arrested or delayed in different conditions.

It has been stated that isoniazid in relatively high concentrations is bactericidal (Steenken and Wolinsky 1952, Middlebrook 1952). Since, however, the drug is effective against sensitive tubercle bacilli in very low concentrations there is always a risk that even in subculture sufficient drug may be carried over to exert a continued bacteriostatic effect. The difficulty of deciding how the drug acts is increased by the inactivation which we have shown to occur on incubation in Dubos media, by the fact that the only available method of estimating it in minute quantities is microbiological assay in a similar medium, and by the fact that we have not yet discovered a reliable way of inactivating the drug so as to remove organisms at will from its continual influence. These problems are now being investigated in this laboratory.

The effect of temperature is interesting. We have shown that in uninoculated medium the drug is inactivated on prolonged incubation, and that the speed of inactivation *increases* over the range of 32–42°C. On the other hand the shift in the end-point which we have described *decreases* as the temperature of incubation is raised—in inoculated media the sensitivity of *Myco. tuberculosis* remains unchanged on prolonged incubation at 40°C, in contrast to the unstable end-point which we have found at lower temperatures.

At 35°C the initial activity of the drug appears to be many times greater than at 37°C and 40°C, though on continued incubation the shift in the end-point is even greater at 35°C than at 37°C. This is interesting in view of the claim by Eseltine and Rahn (1949) to have shown that the bacteriostatic action of some drugs is greatly *increased* at low temperatures whereas bactericidal action is more effective at higher temperatures.

Something of this kind may occur with isoniazid. Our experiments suggest that at 35°–37°C the drug is predominantly bacteriostatic, but that increase in temperature profoundly modifies its action either by making it more bactericidal or by suppressing the mechanism whereby resistant organisms become selected.

We have recently discussed the effect of heat in suppressing certain adaptive processes—e.g., penicillinase formation—which may be essential for the survival or growth of the bacterial cell, and we have suggested that quite small changes of temperature may be important in vivo as well as in vitro (Knox and Collard 1952). If isoniazid is more bactericidal at temperatures above 37°C, this would help to explain why it is the toxic pyrexial patient who responds most dramatically to the drug (Robitzek et al. 1952), and perhaps why experimental tuberculosis of the cornea (Goulding and Robson 1952) is more efficiently controlled by isoniazid in the rabbit (with a body-temperature of about 38°C) than in the mouse (with a body-temperature 4° lower). The remarkable influence of temperature on the action of isoniazid on the tubercle bacillus would seem to be an interesting field for further investigation.

The remarkable effectiveness of streptomycin or P.A.S. in preventing the shift in the sensitivity of H37Rv to isoniazid suggests that the combination of either of these substances with isoniazid may prove more effective than isoniazid by itself in the treatment of tuberculosis. How subinhibitory amounts of streptomycin act with isoniazid in preventing the shift in the end-point is being investigated further. We have found that isoniazid continues to be destroyed in Dubos medium in the presence of streptomycin. Thus the combination must act either by preventing isoniazid-resistant mutants from appearing in the culture or by turning a bacteriostatic action of isoniazid into a bactericidal effect. It looks, therefore, as though the combination acts in the same kind of way as raising the temperature of incubation.

These results together with the experimental and clinical results published in accompanying papers

(Goulding and Robson 1952, Joiner et al. 1952) indicate that, whereas isoniazid is likely to be of limited value by itself, in combination with other substances it represents an outstanding advance in the chemotherapy of tuberculosis. The remarkable specificity of its action should provide a valuable clue to the metabolism of the tubercle bacillus and in the search for other compounds with similar or even greater activity to which resistance develops less readily.

SUMMARY

These studies confirm the American statement that isoniazid has a powerful and specific inhibitory effect on *Myco. tuberculosis*. In Dubos liquid medium the growth of *Myco. tuberculosis* H37RV and of many strains freshly isolated from patients was inhibited initially by as little as 0·01 μg. per ml.

The "sensitivity," must, however, be read after a standard period of incubation, such as fourteen days, since with continued incubation the end-point shifts. This is due to two processes: (1) inactivation of the drug, which occurs even in uninoculated Dubos medium at 37°C, though in distilled water the drug is stable at that temperature and withstands autoclaving; and (2) the emergence of resistant organisms.

The speed of inactivation of isoniazid in uninoculated Dubos medium varies directly with the temperature of incubation. On the other hand, the shift in the end-point in inoculated media at 35°C and at 37°C is almost completely suppressed at 40°C.

Streptomycin or P.A.S. has the same effect as increase of temperature in delaying the shift in the end-point; yet streptomycin does not prevent the inactivation of isoniazid in uninoculated Dubos medium. It seems likely that both increase of temperature and drugs such as streptomycin or P.A.S. convert a predominantly bacteriostatic action of isoniazid into a more nearly bactericidal action.

Isoniazid-resistant strains have been isolated in vitro without difficulty, though the degree of resistance is not so great as that obtained eventually with streptomycin. Isoniazid-resistant strains retained their original sensitivity to streptomycin, and vice versa. Isoniazid resistance was found to be retained after six subcultures in drug-free medium.

The Dubos medium used in these experiments was supplied by Dr. E. H. Bailey, of the Southern Group Laboratory. We are grateful to Dr. R. J. W. Rees (Medical Research Council) for the strain of H37RV used. We should like to thank Mr. D. E. Seymour, of Herts Pharmaceuticals Ltd., for the supplies of isoniazid ('Pycazide'). In a few experiments we used a sample of isoniazid ('Rimifon') kindly supplied by Messrs. Hoffman-La Roche.

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TITRATION OF STRAINS OF TUBERCLE BACILLI AGAINST ISONIAZID

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THE widespread use of isoniazid (isonicotinic acid hydrazide) in the chemotherapy of tuberculosis has presented various problems to the laboratory worker. The most important aspect is likely to be the estimation of the sensitivity of strains of *Mycobacterium tuberculosis* to the drug. The purpose of this paper is to describe certain conditions which may influence any test which is employed, and in particular the effect of variations in the composition and pH of the medium, the stability to heat of the drug, the influence of the size of the inoculum, and the occurrence of resistance to streptomycin or *p*-aminosalicylic acid (P.A.S.) resistance in the strains being tested.

METHODS

Strains of Myco. tuberculosis

The virulent human strain H37RV was used for most of the work. It was obtained in 1947 from the Depot of Standard Cultures of Tubercle Bacilli, Saranac Lake, U.S.A., and was maintained for two years on Proskauer and Beck's synthetic medium and, since then, on Löwenstein-Jensen medium. Several recently isolated strains of tubercle bacilli were also employed.

Media

The following media were used: (1) a modified Dubos and Davis liquid medium containing 'Tween 80' and bovine albumin (Medical Research Council 1948), referred to as Dubos medium; (2) the same medium without the addition of Tween 80; (3) Dubos oleic-acid albumin solid medium (Dubos and Middlebrook, 1947); (4) Herrold's (1931) egg agar medium; and (5) Löwenstein-Jensen medium.

Isoniazid

This was supplied as 'Nydrazid' by Messrs. E. R. Squibb & Sons, London. A stock 1% solution was sterilised by filtration through a Berkfeld candle and was stored at 4°C.

Sensitivity Tests to Streptomycin and P.A.S.

Streptomycin sensitivity was determined by the Medical Research Council (1948) technique, and P.A.S. sensitivity by a similar method in which the inoculum was ten times smaller. The results are expressed relative to those obtained with H37RV, which was usually inhibited by 0·5 or 0·25 μg. per ml. both of streptomycin and of P.A.S.

* In receipt of a grant from the Medical Research Council.

TABLE I—SENSITIVITY TO STREPTOMYCIN AND P.A.S. OF STRAINS TESTED FOR SENSITIVITY TO ISONIAZID IN DUBOS MEDIUM

Strain	Number of times less sensitive than H37RV	
	Streptomycin	P.A.S.
H37RV	1	1*
1	1	1*
2	1	1
3	8	1
4	8	1
5	64	1
6	128	1*
7	> 8000	1*
8	1	128*
9	4	128*
10	32	256

* Strains also tested in Dubos medium without Tween 80, Herrold's medium, and Dubos oleic-acid albumin agar medium.

RESULTS

Sensitivity of Strains in Various Media and Effect of Duration of Incubation

Serial twofold dilutions of isoniazid were made with 3-ml. amounts of Dubos medium and of Dubos medium without Tween 80 in 1/4-oz. screw-capped bottles. Similar dilutions in Dubos solid medium and in Herrold's medium were prepared in 1/2-oz. bottles. To each bottle was added 0·02 ml. from a ten-day culture of six strains of tubercle bacilli. In addition a further five strains were tested in Dubos medium alone. The sensitivity of these strains to streptomycin and P.A.S. is shown in table I.

After ten days' incubation the strains were inhibited in Dubos medium by 0·012 or 0·025 μg. per ml. isoniazid. In Dubos medium without Tween 80 all strains were inhibited by 0·025 μg. per ml. On the solid media the highest drug concentration on which maximum growth occurred was 0·012 or 0·025 μg. per ml. although sparse growth usually occurred on the slope with the next highest concentration.

After fourteen to twenty-eight days, as incubation continued, growth began to appear in progressively higher concentrations of isoniazid up to 1·6 μg. per ml., but not in higher concentrations even after incubation for seventy days. On solid media only very scanty colonies developed on slopes containing between 0·2 and 1·6 μg. per ml. isoniazid.

TABLE II—EFFECT OF INOCULUM SIZE ON SENSITIVITY TO ISONIAZID TESTED ON LÖWENSTEIN-JENSEN MEDIUM

Dilution of inoculum suspension	Days of incubation	Concentration of isoniazid (μg. per ml.)					
		0	0·025	0·05	0·1	0·2	0·4 and over
Undiluted ..	10	+ +	+ +	+ +	0	0	0
	28	+ + +	+ + +	+ + +	+	0	0
	56	+ + +	+ + +	+ + +	+	5	0
1 : 10 ..	10	+	+	0	0	0	0
	28	+ +	+ +	+ +	0	0	0
	56	+ +	+ +	+ +	3	2	0
1 : 100 ..	10	0	0	0	0	0	0
	28	+	+	+	4	3	0
	56	+	+	+	7	3	0
1 : 1000 ..	10	0	0	0	0	0	0
	28	8	11	8	0	0	0
	56	8	11	8	0	0	0

+ + + to + = degrees of growth. The numerals under concentration indicate the numbers of colonies on the slopes. In each case the results after seventy days' incubation were identical with those at fifty-six days.

The addition of 1 μg. per ml. of either *p*-aminobenzoic acid or of nicotinamide to Dubos medium did not alter the sensitivity of H37Rv to isoniazid.

Effect of Different Inoculum Sizes

Sets of bottles of Dubos medium containing twofold dilutions of isoniazid were inoculated with fivefold dilutions of an eight-day Dubos culture of H37Rv. After ten days' incubation the minimal inhibitory concentration in bottles which had received 0·1 and 0·02 ml. was 0·05 μg. per ml., whereas it was 0·025 and 0·0125 μg. per ml. in those which had received 0·004 and 0·0008 ml. respectively. With further incubation, growth appeared more rapidly and in higher concentrations of the drug in bottles which had the larger inocula.

A series of slopes of Löwenstein-Jensen medium were prepared to which isoniazid had been added before a single period of about one hour's inspissation at 80°C. These were inoculated with a 3-mm. loopful of a suspension of H37Rv prepared by grinding up growth from solid medium in distilled water. The suspension was of almost equal opacity to that of a ten-day Dubos culture. The results are shown in table II. Here again it will be noted that inoculum size had little effect on the inhibitory end-point.

TABLE III—EFFECT OF pH ON THE ACTIVITY OF ISONIAZID IN DUBOS MEDIUM

pH of medium	Minimal inhibitory concentration of isoniazid (μg. per ml.) after incubation for		
	9 days	14 days	21 days
5·0	0·06	0·025	0·025
5·5	0·025	0·025	0·025
6·0	0·025	0·025	0·05–0·1*
6·5	0·025	0·05	0·4–0·8*
7·0	0·025	0·05	0·1–0·4*
7·5	0·025–0·05*	0·05	0·4
8·0	0·025	0·05	0·1–0·4*

* Where two figures are given they are those obtained when the duplicate readings did not agree.

Effect of pH

The pH of batches of Dubos medium was adjusted by the addition of hydrochloric acid or sodium hydroxide so that the final pH, after addition of albumin, ranged from 5·0 to 8·0, as measured with a Muirhead pH meter. Each batch was then distributed in 3-ml. amounts and isoniazid added in a range of twofold serial dilutions. Every set of tubes was set up in duplicate. Each bottle was inoculated with 0·02 ml. of an eighteen-day Dubos culture of H37Rv. The minimal inhibitory concentration of isoniazid after incubation for nine, fourteen, and twenty-one days is shown in table III. Alterations in pH clearly have little effect on activity, if one takes into account the slower growth of the strain at pH 5·0.

Heat Stability

Incubation at 37°C.—Sets of bottles containing a range of twofold serial dilutions of isoniazid in Dubos medium were prepared under identical conditions. One collection of sets was stored at 4°C and the other at 37°C. At intervals two sets of bottles were taken from each collection and inoculated with 0·02 ml. of a Dubos culture of H37Rv. The minimal inhibitory concentration of isoniazid found after ten days incubation is shown in table IV. There was no evidence of destruction at 4°C; but there was a considerable loss of activity when tubes were stored at 37°C, only about 5% of the activity being present after six weeks.

Autoclaving and steaming.—Sets of tubes containing dilutions of isoniazid in Dubos medium without albumin were prepared under identical conditions. Pairs of sets were subjected to steaming for ten and thirty minutes and to autoclaving at 15 lb. per sq. in. for fifteen, thirty, and sixty minutes. A control pair of sets was untreated. Albumin and an inoculum of 0·02 ml. of a Dubos culture of H37Rv were then added to all the tubes. The minimal inhibitory concentration of isoniazid found after twelve days' incubation was 0·05 μg. per ml. in each set. Growth was considerably heavier in tubes containing 0·025 μg. per ml. which had been autoclaved for thirty and sixty minutes than in those receiving the milder treatments. This suggests that there may have been a slight loss of activity after prolonged autoclaving.

TABLE IV—EFFECT OF INCUBATION AT 37°C ON THE ACTIVITY OF ISONIAZID IN DUBOS MEDIUM

Period of storage (days)	Minimal inhibitory concentration of isoniazid (μg. per ml.) after storage at	
	4° C	37° C
0	0·05	
7	0·05–0·1*	0·1–0·2*
21	0·05–0·1*	0·2–0·4*
42	0·1	1·6–3·2*

* Where two figures are given they are those obtained when the duplicate readings did not agree.

DISCUSSION

The degree of sensitivity of strains of *Myco. tuberculosis* and the lack of cross-resistance to streptomycin and P.A.S. agree well with the reports of Steenken and Wolinsky (1952) and of Pansy et al. (1952). The occurrence of growth in progressively higher concentrations of the drug with increasing periods of incubation can be explained by the presence of small numbers of resistant organisms in the original inoculum, since subcultures from tubes containing 0·4–1·6 μg. per ml. yielded strains which were less sensitive to the drug. The behaviour of these resistant strains will be discussed elsewhere. Similar findings have been reported by Pansy et al. (1952), Steenken and Wolinsky (1952), and Rist et al. (1952).

The rather small effect of changes in inoculum size resembles that found for streptomycin, but is different from that found with P.A.S. where sensitivity to the drug changes distinctly with changes in the size of the inoculum. The most pronounced effect of increasing the inoculum size was to increase the speed of appearance of resistant variants in tubes containing higher concentrations of the drug.

Alterations in pH have been shown to have little effect on the activity of isoniazid. This behaviour differs from that of streptomycin, whose activity is greatly diminished in acid media, and may be important in the treatment of tuberculosis since caseous material is often acid. Loss of activity found during incubation at 37°C has also been reported by Goulding et al. (1952). It is remarkable that there is so little loss due to heating at higher temperatures for up to an hour.

From these findings a few comments can be made on techniques for determining the sensitivity of tubercle bacilli from patients under treatment with isoniazid. It seems safe to incorporate the drug in Löwenstein-Jensen medium before inspissation. The activity will not be altered appreciably either by the heating or by alterations in the pH—a difficult factor to control in egg media. Since resistant strains obtained both in vitro and in vivo have been found to be unstable on culture in media free of isoniazid (Pansy et al. 1952, and personal observation) it would be wise to test their resistance as soon as possible after isolation. However the plating-out of sputum concentrates directly on medium containing a range of concentrations of isoniazid may be inadvisable for the following reasons:

1. The period of incubation before appearance of colonies is more variable on primary culture than on subculture. If this period is prolonged there might have been an appreciable loss of activity of the drug during incubation at 37°C.

2. An inoculum containing a small number of bacilli would yield an unreliable result, and a further test from the control tube would then have to be set up. It is at present doubtful whether such a result could be compared with the results of a direct test.

For those reasons the technique outlined by the Medical Research Council (1952) is recommended in which growth from the primary culture is inoculated directly on to Löwenstein-Jensen slopes containing a range of isoniazid contractions. The results of such tests, though not necessarily reflecting the true degree of resistance of the strains, would at least allow comparison of the results between tests and would minimise any loss of resistance during subculture.

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THE CORRECT PHYSIOLOGICAL BASIS ON WHICH TO COMPARE INFANT AND ADULT RENAL FUNCTION

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IN order to compare certain aspects of renal function within the same species but in members of very different age and size, there has been a desire to find a method by which the absolute measurements may be reduced to some common basis. It was suggested by McIntosh, Möller, and van Slyke (1929) and by Holten (1931) that the comparisons should be made per unit of surface area, because in both young and old the weight of the kidney and the basal metabolic rate were proportional to this. It was found by these workers, moreover, and confirmed by others (Payne and Shukry 1934, Cullen et al. 1935) that, if surface area was used as the basis of comparison, the urea clearance of a child above the age of one or two years had the same numerical value as that of an adult. Schoental et al. (1933) found the relationship to hold for children as young as two months, and its physiological correctness and clinical value for older children have never been seriously questioned.

McCance and Young (1941) showed that, if a factor based upon surface area was used to make the comparisons between adults and very young infants, even healthy infants appeared to have lower glomerular filtration-rates and clearances of urea than adults. There were two ways of interpreting these findings. One was to suppose that the infants, although healthy, were physiologically undeveloped—i.e., that the functional capacity of the kidney of the infant had in some way lagged behind its anatomical and other physiological development. The other was to assume that surface area was not the correct basis on which to make the comparisons. McCance and Young (1941) considered various bases on which the comparisons might be made and discussed the possibilities of body-weight, kidney weight, total basal metabolic requirements, &c., and finally adopted surface area as appearing at that time the most reasonable one.

The experimental results of McCance and Young (1941) have been amply confirmed and extended (Dean and McCance 1947, Barnett et al. 1948, Rubin et al. 1949), and surface area has continued to be used as the basis of comparison (H. Smith 1951), although with some reservations (C. A. Smith 1951). This has led to the idea that there is something almost unphysiological about the healthy infant's kidney and certainly that it is an inefficient organ by adult standards. Several papers have been written, for instance, on the maturation of renal function in the first year or two of life (West et al. 1948, Rubin et al. 1949). The kidney of the newborn may be inefficient when the organ is subjected to some stress, or when some test load is applied to it (see below), and there may be differences between the tubular and glomerular adjustments of infants and adults (McCance 1950); but the following considerations suggest that the real understanding of juvenile renal function has been delayed by the selection of an incorrect basis of comparison.

EXCRETION OF UREA

If the function of the kidney is regarded as preeminently the regulation of the constancy of the body-fluids, three things must be borne in mind:

(1) The concentration of urea in the body-fluids varies little from day to day, or indeed from decade to decade.
(2) The concentration of urea in the body-fluids depends on its rate of formation and its rate of elimination.
(3) Urea is dissolved in the whole of the water in the body, and for present purposes its concentration in this may be taken to be the same throughout.

To maintain the amount of urea in the body within normal limits, the rate of excretion by the kidney must keep pace with the rate of formation. If in this state of dynamic equilibrium the urea formed per minute is equivalent to the amount dissolved in x ml. of the body-water, the kidney may be regarded as clearing x ml. of the body-water every minute, and it is accordingly suggested that the urea clearances should be expressed per unit of total body-water. If this be done, it becomes possible to compare the results for old and young, large and small, within any one species, by a method which is physiologically sound. Functions, moreover, on which the clearances of urea depend, such as the glomerular filtration-rate, may also very properly be compared on this basis. The excretion of water will receive special consideration later.

The accompanying table gives the average urea clearances and glomerular filtration-rates which have been found by McIntosh et al. (1929), Cullen et al. (1935), Dean and McCance (1947), Barnett et al. (1948), and Rubin et al. (1949). They are expressed in terms of the total body-water of an "average" adult as well as in terms of the adult surface area. The figures for body-water were obtained by assuming that the body of an adult weighing 70 kg. contains 60% of water—i.e., 42 litres (McCance and Widdowson 1951); that the body of a child above six months of age also contains 60% of water; and that the body of an infant under six months of age contains 69–77% of water according to its weight (Widdowson and Spray 1951). The figures obtained by Barnett et al. (1948) and Rubin et al. (1949) for healthy infants, which were well below those of adults when they were expressed per 1·73 sq. m. of surface area, are equal to those of adults when they are expressed per 42 litres of body-water. The clearances of children aged 138–356 days (Barnett et al. 1948), which were a little lower than those of adults on the basis of surface area, are higher per 42 litres of body-water, and the urea clearances of older children, which were equal to the urea clearances of adults per 1·73 sq. m. of surface area, are considerably higher than those of adults when expressed per 42 litres of body-water. This is only to be expected on physiological grounds, since the protein intake of children per kg. of body-weight, and hence per kg. of body-water, is much higher than that of adults. A comparatively small amount of this protein is required for growth in older children; and, were the clearances not higher, the concentration of urea in the body-water would normally be about 70 mg. per 100 ml. at the age of five years, which it certainly is not. It may be the level of protein metabolism in children which determines the magnitude of the glomerular filtration-rates and urea clearances. An increase or a decrease in the protein intake materially raises or lowers the glomerular filtration-rate in seals (Ladd et al. 1951), dogs (Jolliffe and Smith 1931, Shannon et al. 1932), and rats (Dicker 1948), and although the effect is much smaller in human adults it may be large in children. A high-protein diet certainly leads to renal hypertrophy in young animals (H. Smith 1951). If the renal clearances of newborn infants respond rapidly to the protein intake, the low clearances obtained by Dean and McCance (1947) (see table) may be explained, for the children used by them had been deprived of food for fifteen or sixteen hours before the tests were made.

If this physiological basis for comparing renal function of small and large individuals is adopted, some of the results and many of the conclusions about juvenile renal function will have to be re-examined. This is now being done. It goes without saying that, if the urea clearances are expressed per unit of body-water for physiological purposes, it does not prevent them from being given as a percentage of normal in clinical reports.

EXCRETION OF WATER

It is usual to study the excretion of water by administering a test dose, and to follow the response of the organism to this disturbance in the amount and composition of its body-fluids. It is clear therefore that the dose administered should be calculated in relation to the total volume of the body-water. The organism gets rid of water not only by the kidneys but also by the lungs and skin. The last two are likely to be more important in the infant than in the adult, but the figures given by Levine et al. (1938)—admittedly for older babies—show that they are relatively unimportant in the few hours following a large test dose. If, however, the organism is weighed at suitable intervals before and after the test dose, and if the volumes of water excreted by the kidney are also recorded, both the renal and extrarenal losses may be measured and distinguished.

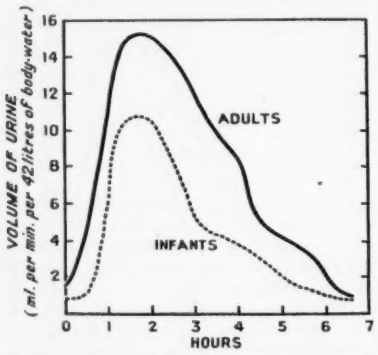
Since the object of the experiment is really to compare the rates at which the kidney restores the composition of the body, and therefore the amount of the body-water, to normal in infancy and in adult life, the correct basis of comparison must surely be the percentage of the dose excreted, or the ml. excreted, per unit volume of total body-water. Suppose, for example, that a 70 kg. adult and a 3·6 kg. infant are given 3500 and 180 ml. of water respectively, and that they excrete respectively 3500 and 90 ml. by the kidney within the next five hours. The volumes excreted are absolute amounts, have real meaning in relation to the dose given, and are equal to 3500 and 1500 ml. if expressed per 42 litres of body-

UREA CLEARANCES AND GLOMERULAR FILTRATION-RATES
("Maximum" clearances only used)

Reference	Figures averaged	Age of children	No. of children	Urea clearance (ml. per min.)		Glomerular filtration-rate (ml. per min.)	
				Per 1·73 sq. m.	Per 42 litres of body-water	Per 1·73 sq. m.	Per 42 litres of body-water
Dean and McCance (1947)	Table 4	2–8 days	4	17	42	34	82
Barnett et al. (1948) ..	Table 1B, BA, RA, PI A and B, MA, RO, PA	3–13 days	7	34	78	48	109
Rubin et al. (1949) ..	Table 1A, p. 1147	2–22 days	11	29	71	49	122
Barnett et al. (1948) ..	Tables 1 and 1A, ML, GR, GO, KE twice	8–28 days	4 (one twice)	34	77	51	116
Rubin et al. (1949) ..	Table 1A, p. 1148	54–118 days	9	35	77	67	149
Rubin et al. (1949) ..	Table 1A, pp. 1149 and 1150	138–356 days	12	55	104	100	204
McIntosh et al. (1929) ..	Table 1	2–12 years	8	72	115	—	—
Cullen et al. (1935) ..	Table 1	5–13 years	61	78	123	—	—
	Normal adult value			75	75	120	120

water. If, however, the figures are expressed per 1·73 sq. m. of surface area, the first remains 3500 ml. for the adult and the second becomes 630 ml. for the infant; the latter is misleading since it represents the infant as having a poorer renal function than it in fact has. McCance and Wilkinson (1947), Heller (1947, 1951), Dicker and Heller (1951), Ladd et al. (1951), and others have expressed the dosage and excretion of water per unit of body-weight. This basis is theoretically not more correct than that of surface area, but the results given by it are much nearer those based upon body-water.

Experiments recently carried out by N. J. Naylor and R. A. McCance (unpublished) suggest that the figures in the example given above are fairly near the truth for babies in the first few weeks of life. The accompanying illustration shows a comparison of the average rates of excretion of water by six infants and five adults after administering an amount equal to 6% of their body-water by mouth. The figure brings out two further points about the treatment of a large dose of water:



Minute volume of urine of infants and of adults after administration of amount of water equal to 6% of the body-water.

(1) The time relationships of the onset, peak, and course of the diuresis were very much the same at each age, and hence the absorption-rates and time relationships for the post-pituitary functions were in all probability also similar.

(2) The flow of urine subsided to its base-line in infants before the dose had been excreted, with the result that the response of the kidney came to an end while the amount and composition of the body-fluids were still abnormal. Dicker and Heller (1951) seem to have made a similar observation on guineapigs.

These findings are being further explored.

EXCRETION OF SODIUM, CHLORIDE, PHOSPHATE, AND OTHER IONS

The excretion of these substances by the kidney is a more complicated process than that of urea—at any rate less is known about it—and further experimental work is desirable before making definite suggestions about the basis on which the functions in infants and adults should be compared. A satisfactory physiological basis can only be reached if the following points are taken into consideration:

(1) The size and nature of the pool which the kidney drains.

(2) The concentration of the substance in that pool.

(3) Unless the pool is getting larger or smaller (which may happen in the metabolism of sodium), or the concentration of the substance in it is changing from day to day (which may happen in potassium or phosphorus metabolism), the amount excreted by the kidney in each twenty-four hours must equal the net quantity entering the pool.

(4) There are reasons for believing that the stability of the pool is so important physiologically that mechanisms have been developed by which the amount of a substance removed daily by the kidney may be rapidly altered to prevent variations in the amount entering the pool from materially altering its size and composition. No comparisons can be made without equating these variables or allowing for them.

COMMENT

Hitherto there has been a tendency to oversimplify the whole problem of comparing adult and juvenile renal function. The approach has been too rigid, and this has led to confusion of thought and contradictory conclusions. It may not be possible to make every comparison on the same basis, and it is certainly not reasonable to expect to be able to do so on the basis of surface area.

Even in the so-called objective sciences any proposals involving changes in established thought or practice are likely to meet with considerable opposition (George 1936, Beveridge 1950). The suggestions now put forward certainly come into the category of those which are likely to upset current conceptions, and as such will be opposed on subjective grounds. It is hoped nevertheless that they will receive at least some objective consideration.

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THE MULTILOCULAR CYSTIC TUMOUR OR ADAMANTINOMA OF THE JAW

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THERE is considerable confusion as to the nature of adamantinoma and its treatment. The old names—"multilocular cyst," "epithelial odontome," and "ameloblastoma"—seem to have been discarded for "adamantinoma," which is admitted to be inappropriate (Lucas and Thackray 1951). "Multilocular cystic tumour" is an accurate description, but "fibrocystic disease of the jaw"—a still older name—is misleading. However, "adamantinoma" is convenient and appears to have been universally adopted for some years.

I have treated 14 cases of this tumour and have studied the reports on it published in English during the past thirty years.

A true multilocular cystic tumour or adamantinoma is not malignant, in spite of the fact that it recurs readily if it is not completely excised with its capsule intact. It begins as a solid encapsuled endosteal tumour usually in the molar region of the mandible: I have seen one only in the maxilla. This tumour grows slowly until cysts begin to form, especially just under the capsule;

but the cysts may form in any part of the tumour. The cysts begin to expand, and then the tumour rapidly increases in size, spreading upwards into the ascending ramus of the mandible. When the cysts burst through the alveolar plates, the tumour extends into the soft tissues of the floor of the mouth or into the cheek. Very large tumours have extended from the coronoid process into the pterygomaxillary fossa.

Specimen no. 385 in the museum of Charing Cross Hospital Medical School is a solid encapsuled nodular tumour attached to the crown of a molar tooth. The roots of the tooth are underdeveloped. This tumour was enucleated from the mandible of a boy, aged 5 years, fifty-one years ago. The histological section showed it to be what was then called an epithelial odontome.

HISTOLOGY

The histology of the tumour varies, but it is an epithelial tumour with follicles lined by a layer of typical palisade-like columnar cells and containing a fine stellate reticular tissue. The palisade epithelial cells resemble the ameloblasts, and the stellate tissue is like that of the enamel organ of the developing tooth germ. There is little evidence that these tumours arise from the developing tooth germ, and similar tumours have been found in the long bones of the skeleton. Coley (1949) has collected 18 such cases. I have examined the histological sections of 10 tumours and found no connection between the surface epithelium of the gum and the tumour. The fine interstitial tissue may contain groups of epithelial cells and small cysts. The groups of epithelial cells have been mistaken for carcinoma cells, but it is more common for a basal-celled carcinoma or an adenocarcinoma to be mistaken for an adamantinoma. I have known 3 basal-celled carcinomas and 2 adenocarcinomas to be diagnosed as adamantinoma. A basal-celled carcinoma arises from the surface epithelium, and the club-like processes of large epidermal cells spread into the deeper tissues. I have never seen a malignant adamantinoma. Two or more cases of metastatic growths secondary to an adamantinoma have been recorded (Coley 1949, Waterworth and Pullar 1948), but possibly the primary tumour was not a true adamantinoma. Lucas and Thackray (1951) describe eight different histological types of adamantinoma, ranging from the primitive type to the melano-ameloblastoma. Three sections of tumours which have recurred after incomplete removal (one after scraping) show a considerable increase of the epithelial cells in the interstitial tissue compared with the first tumour removed.

DIFFERENTIAL DIAGNOSIS

Clinically these tumours resemble in some ways the simple encapsuled parotid tumour. There are four different types of parotid tumour, according to the predominance of the kind of tissue forming its structure: the fibrous tumour, which is very similar histologically to the primitive type of adamantinoma; the myxomatous; the mucous; and the epithelial. The epithelial type of tumour has in the past been called an endothelioma, or cylindroma: it is now called an adenoma and is sometimes malignant. The parotid tumour has been found anywhere in the mouth, palate, cheeks, jaws, and pharynx, and in the neck.

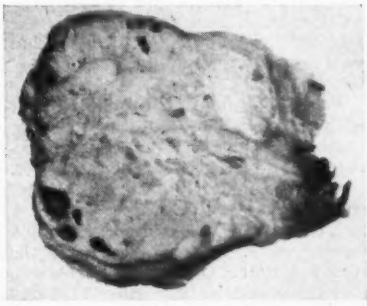

Fig. 2—Recurrence of tumour in 1951 in operation scar of 1931 (see fig. 1).

The diagnosis of adamantinoma is usually obvious—biopsy is rarely necessary, and there are good reasons for not taking a biopsy specimen from an encapsuled tumour. There is no difficulty in recognising a carcinoma or an adamantinoma during its removal. Of course a large piece of the tumour is sectioned immediately after it has been removed.

TREATMENT

Complete excision by diathermy and dissection is the most successful treatment. The coöperation of a dental surgeon is necessary because the jaw may have to be resected. Apparatus to fix the fragments of the jaw and interdental splints should be made, and septic teeth should be extracted before the operation. The tumour should be thoroughly and completely exposed and its limits defined. To achieve this, good access is necessary. Stereoscopic X-ray photographs are studied to assist in the definition of the limits of the tumour.

The choice of mouth gag is important. I prefer the Davis gag with its tongue-depressor, and it is a very satisfactory gag for an edentulous patient (Warwick James 1940). When this gag is used, the patient's head is extended over a sandbag in the position for enucleation of the tonsils. An efficient headlamp and a suction pump are essential. If the tumour is in the lower incisor region the patient is well propped up in the sitting position with the surgeon standing and looking down on the teeth. Denhard's gag is useful for a tumour in the incisor area.

Division of the lower lip in the midline does not give much better access; it causes deformity of the mouth by drooping of its angle and it is really unnecessary. Division of the upper lip for tumours of the upper alveolus gives better access without subsequent deformity. When the maximum exposure of the operation area has been obtained, a long incision of the mucoperiosteum is made down to bone at the lowest point of the cheek sulcus. The incision is made with a diathermy cutting needle from the ascending ramus to the symphysis. A similar incision is made as low down as possible on the inner or buccal surface of the mandible, and the two incisions are united well behind and well in front of the tumour to include an elliptical area of the surface mucoperiosteum, which is excised with the

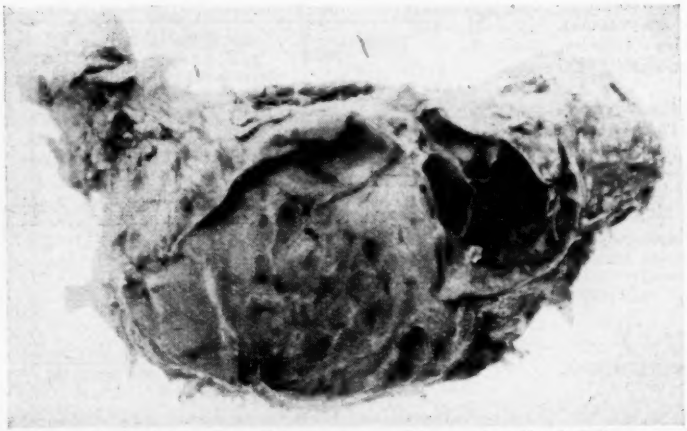

Fig. 1—Multilocular cystic tumour removed by resection of jaw in 1931.

tumour. The mucoperiosteum is rasped off the bone to the lower edge of the mandible. Four or five pairs of curved artery-forceps are clipped to the edge of the mucosa and, if allowed to hang down, act as good retractors of the lip and cheek. The mucosa of the buccal surface is rasped off the bone, and then the thinned covering bone is removed with nibbling forceps all around the tumour and beyond its circumference and to the bottom of the bony cavity.

When the tumour is fully exposed it is dissected away with a blunt flat dissector working well outside the capsule and any of its cystic prolongations. Great care is taken to preserve the capsule intact.

I have completely excised 8 of these tumours in this way. At the end of five years there was no recurrence; in 2 cases there was still no recurrence after sixteen and twenty years. If it is found, when the tumour has been removed, that it has an inaccessible prolongation upwards into the ramus or any other part of the mandible, the jaw can be resected with a Gigli saw through a large external flap incision. Scraping and trying to enucleate the tumour with a sharp spoon is useless—recurrence is almost certain, and then it is more difficult to define the tumour and to excise it completely. If a small prolongation is left, or even if the capsule is ruptured, recurrence is probable. I am opposed to the set operation of resection of the jaw without first defining the limits of the tumour. If the tumour recurs after a complete excision, then a resection of the jaw may be necessary. In a few advanced cases the diagnosis has been too late and resection is the only possible operation which will achieve a complete removal of the tumour. The earlier the diagnosis the better the prospect of a complete removal. I have seen 2 cases of recurrence of the tumour twenty-one years and ten years after resection of the mandible.

In a case illustrated in the Middlesex Hospital museum an alleged dentigerous cyst containing two inverted teeth was incised and scraped in 1910. In 1924 a tumour recurred which gradually increased in size until in 1928 a solid tumour with a cyst was excised. In 1931 there was a recurrence, for which the jaw was resected (fig. 1). In 1951 an encapsuled globular tumour recurred (fig. 2), which was dissected out of the scar tissue by Mr. Douglas Ranger.

In my experience deep X-ray therapy has been unsatisfactory and disappointing. It is difficult to imagine that an embedded cystic encapsuled tumour should disappear with radiotherapy. The most that happens is that the cyst wall becomes fibrosed and thickened, and excision of the tumour is made more difficult. Necrosis of the bone, osteomyelitis, and burning of the mucosa and skin have occurred without any benefit, but with considerable misery to the patient. X-ray photographs after radiotherapy may show improvement by fibrosis in the superficial part of the tumour, but the more inaccessible deep portion remains. Recurrence of the growth is inevitable within a year or so.

Radiotherapy has been recommended in the extensive inoperable tumour which has burst through the bone into the soft tissues and inaccessible areas—for example, in an old man who has had a coronary thrombosis or is in bad physical condition. I prefer to treat this type of case by draining the cysts through large openings.

I am indebted to the Ferens Institute of Otolaryngology and to Dr. A. C. Thackray, of the Bland-Sutton Institute of Pathology, Middlesex Hospital, for the opportunity of studying specimens and sections; also to Mr. B. W. Fickling and Mr. Rainsford Mowlem.

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PLASMA-ESTERASE AND PLASMA-LIPASE LEVELS IN NUTRITIONAL ŒDEMA SYNDROME (KWASHIORKOR)

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THE effect of malnutrition on the production of enzymes by tissues has been receiving increasing attention in recent years.

Hutchinson, McCance, and Widdowson (1951) found the serum-cholinesterase level below normal in undernourished Germans in Wuppertal. According to them an insufficiency of calories was responsible for decreasing the pseudo, and to a lesser extent of the true, cholinesterase activity; the deficiency of neither protein, nor fat, nor carbohydrate, nor any of the major dietary constituents was considered to be specifically involved.

Hutchinson (1951) observed that undernutrition did not alter the levels of true cholinesterase, phosphatase, catalase, or glyoxalase in red blood-cells, although there was some indication of a slight increase in the level of carbonic anhydrase. However, in dogs and rats, even in severe malnutrition, the serum-pseudocholinesterase level was not lowered.

Veghelyi (1948) observed by duodenal intubation a diminution in the output of pancreatic enzymes in malnourished children in Vienna. The first enzyme to diminish and then to disappear was the lipase, and the last the amylase. He also observed that the blood-lipase and blood-amylase levels were considerably lowered in protein-deficiency states. Dietary treatment with milk powder brought about clinical improvement and a recovery of the enzyme activity.

Thompson and Trowell (1952), who compared by duodenal intubation the pancreatic enzyme activity in 24 African normal children and 59 cases of "a type of kwashiorkor," found the activity of pancreatic amylase and lipase in the kwashiorkor group much lower than in the normal children. In most cases the enzyme activity returned to normal after successful treatment with whole milk, skim-milk, or milk protein alone.

A syndrome similar to, and probably identical with, kwashiorkor has been under investigation at Coonoor for the last four years (Ramalingaswami et al. 1948, Gopalan and Patwardhan 1951). So far, 80 cases have been investigated and treated. In a fairly large number of these the plasma-lipase and plasma-esterase levels were estimated.

We present here the results of our observations in 17 normal children and in 33 with nutritional œdema resembling kwashiorkor.

METHODS

Plasma-esterase was estimated by the method of Cherry and Crandall (1931).

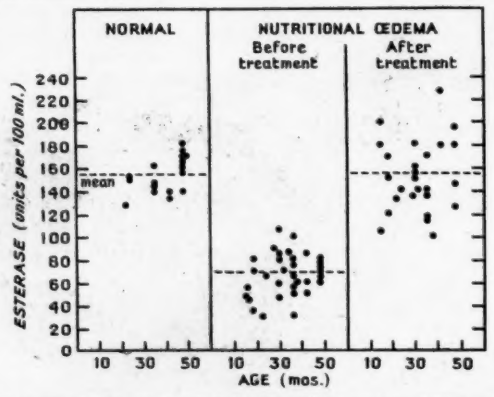

Fig. 1—Plasma-esterase levels in healthy children and in children with nutritional œdema.

TABLE I—PLASMA-ESTERASE AND PLASMA-LIPASE LEVELS IN KWASHIORKOR AND IN HEALTHY CHILDREN

—	Age range	Plasma-enzyme level (units per 100 ml.)							
		Before treatment				After treatment			
		No. of cases	Range	Average	Standard error	No. of cases	Range	Average	Standard error
Esterase :									
In kwashiorkor ..	From 1 yr. 3 mos. to 4 yr.	33	30–105	66·7	± 3·25	27	100–230	154	± 6·64
In healthy children ..	From 1 yr. 10 mos. to 4 yr.	17	130–180	153·5	± 3·61	—	—	—	—
Lipase :									
In kwashiorkor ..	From 1 yr. 6 mos. to 5 yr.	10	30–100	67·0	± 6·80	8	130–305	211	± 20·10
In healthy children ..	From 1 yr. 10 mos. to 4 yr.	17	215–325	258·5	± 7·30	—	—	—	—

Plasma-lipase in the earlier part of the investigations was estimated by the method of Goldstein et al. (1948); but it soon became apparent that, owing to its non-specificity, the method could not give correct values for lipase. Certain modifications were introduced, the most important being the addition of sodium tauroglycocholate to the reaction mixture in a final concentration of $3{\cdot}7 \times 10^{-3} M$ containing tributyrin and plasma. In the presence of tauroglycocholate at the given concentration the esterase activity of plasma towards tributyrin is completely inhibited; hence the estimation gives a measure of lipolytic activity alone. The procedure and

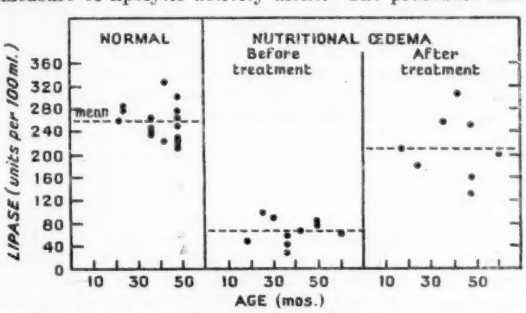

Fig. 2—Plasma-lipase levels in healthy children and in children with nutritional œdema.

interpretation of results obtained by this method are described elsewhere by Srinivasan and Patwardhan (1952).

MATERIAL

The patients investigated were children, aged 15–48 months, of stunted growth, with œdema and diarrhœa. In addition, enlarged liver, dermatosis, and depigmentation of hair—the other features of typical kwashiorkor—were present singly or together in a fair number of cases. The diarrhœa was non-infective and the œdema not of cardiac or of renal origin. Plasma-esterase and plasma-lipase were estimated in blood obtained on admission and on discharge. All the cases were treated with reconstituted skim-milk, the quantities of which were gradually increased according to the tolerance of the patient. In the later stages the skim-milk was supplemented by the hospital diet. On discharge, when a second sample of blood was taken for enzyme studies, the œdema had completely disappeared, the liver, if previously enlarged, had receded, and dermatosis had responded.

RESULTS

The results of observations of enzyme activity are summarised in table I and figs. 1 and 2. The plasma-esterase and plasma-lipase levels, by age-groups before and after treatment, behave (figs. 1 and 2) very much like those of the pancreatic enzymes (amylase, lipase, and trypsin) as described by Thompson and Trowell (1952).

Plasma-esterase levels in 33 cases on admission were 30–105 units per 100 ml., with a mean of 66·7 units. After treatment the observations were repeated in 27 cases only, the levels being 100–230 units per 100 ml., with a mean of 153·8 units. Statistically this difference is significant ($P < 0{\cdot}001$). The range and the average levels in a comparable age-group of normal and apparently healthy children are also given in table I, from which it is clear that, when treatment produced distinct clinical improvement, the plasma-esterase level returned to normal.

Plasma-lipase levels were estimated according to our modification of the method of Goldstein et al. (1948) in only ten cases before treatment and in only eight cases after treatment. From table I it is clear that the changes in plasma-lipase levels are similar to those in plasma-esterase levels.

DISCUSSION

Plasma-esterase

Whipple (1913) suggested that the plasma-esterase level could be used to measure liver function. Holmes and Trowell (1948) reported the failure of liver-cells from biopsy specimens to store glycogen in the presence of liberal amounts of glucose in their cases of kwashiorkor. Waterlow (1950) found a low cholinesterase activity in liver-biopsy specimens in his two cases with fatty liver. These observations make it probable that in kwashiorkor, which seems to be invariably associated with structural and functional damage to the liver, the plasma-esterase level is below normal.

In table II an attempt has been made to compare the degree of fatty infiltration of the liver with the plasma-esterase level in cases where liver structure in biopsy material could be examined. Although it may be too early to draw any conclusion, it does seem possible that some relation may exist between the degree of liver damage and the activity of plasma-esterase. At present not enough biopsy material has been collected before and after treatment to allow comparison in greater detail between the increase of plasma-enzyme activity and alterations in liver structure.

The plasma-esterase levels in patients before treatment show a wide divergence. On the other hand, in every case investigated a distinct rise in the plasma-esterase

TABLE II—PLASMA-ESTERASE AND FATTY INFILTRATION OF LIVER

Case no.	Esterase (units per 100 ml.)	Fatty change *
	(Before treatment)	
1	50	+ + + +
2	65	+ + +
3	60	+ + +
4	75	+ + +
5	75	+ +
6	70	+ +
7	75	+ +
8	80	+ +
9	100	+

* The severity of fatty change was graded as follows :
+ Tiny sudanophil droplets in the cytoplasm of liver-cells.
+ + + + Coalescence of sudanophil droplets in adjoining liver-cells, giving the appearance of large fat cysts.
Intermediate stages were graded + + and + + +.

level was observed after treatment. The final levels after treatment compare favourably with the normal levels in a comparable group of apparently healthy children.

Plasma-lipase

This enzyme probably has its origin in the pancreas. Ordinarily a very small part of the pancreatic enzymes enters the circulating blood, and this is normally excreted in the urine. In conditions like pancreatitis, pancreatic lithiasis, and cancer of the head of the pancreas, increased amounts of amylase circulate in the blood and can be found in the urine in higher concentrations than in normal people (Peters and van Slyke 1946). In these conditions the acinar function is normal, but the secretion of the enzymes into the ducts, or their entry into the duodenum, is interfered with. It might be expected that, in conditions where the capacity of the acini to elaborate the enzymes is impaired, the levels of pancreatic enzymes in the blood would be lower than normal. Davies (1948) has described the structural changes in the pancreas in kwashiorkor, the lesions varying from minor degenerative changes to advanced fibrosis and atrophy. Diminished pancreatic function has been observed by Veghelyi (1948) and Thompson and Trowell (1952) in kwashiorkor. These observations would explain the diminished plasma-lipase activity. According to the latter workers, successful treatment improves pancreatic function, a finding which seems to fit in with the improvement of plasma-lipase levels observed by us. Estimation of plasma-lipase levels may prove to be a more convenient method of determining the state of pancreatic function in kwashiorkor than is duodenal intubation. However, further work, including the estimation of plasma-amylase and plasma-trypsin levels, must be done before this can be accepted.

The plasma-lipase and plasma-esterase levels did not reveal any correlation with total plasma-protein or with plasma-albumin or plasma-globulin. The total-protein levels in 11 cases in the present series were 3·35–5·67 g. per 100 ml., with an average value of 4·8 g., before treatment, and 5·75–7·7 g. per 100 ml., with an average value of 6·87 g., after treatment.

SUMMARY

The plasma-esterase and plasma-lipase levels have been studied in 33 children with nutritional œdema, a condition similar to and probably identical with kwashiorkor, and in 17 apparently normal children who were comparable in age and derived from the class of people in whom this condition is prevalent.

In all the children with nutritional œdema the plasma-esterase and plasma-lipase levels were well below normal. Therapy with skim-milk restored the levels to normal. The possible cause of the lowered levels and their relation to nutritional œdema are discussed.

We gratefully acknowledge the assistance received from the nutrition clinic and the pathology department of the Nutrition Research Laboratories in the conduct of this investigation.

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Medical Societies

MANCHESTER MEDICAL SOCIETY

Heart-disease and Pregnancy

AT the first meeting of the session, on Oct. 7, Prof. J. CRIGHTON BRAMWELL was inducted as president and delivered a presidential address on Heart-disease and Pregnancy.

Professor Bramwell referred to the part a medical society might play in helping to close the gap between consultants and general practitioners, and in bringing the practitioner into closer touch with the growing-points of knowledge. He suggested that the wealth of clinical material in Manchester imposed a corresponding obligation on those working there to undertake clinical research.

Over 1600 pregnant women with organic heart-disease had been investigated in his clinic at the Manchester Royal Infirmary during the past twenty-five years. The first 350 cases had been analysed by Dr. Edith Longson and himself in 1938, and 500 of the more recent cases had been similarly analysed by Dr. Morgan Jones.

The risk of pregnancy in patients with heart-disease depended on the severity of the disease, and could usually be assessed by the patient's tolerance for exercise before pregnancy. In patients with trivial heart-disease the risk was negligible; in those whose tolerance for exercise was reduced to a greater or lesser extent the added risk was appreciable; while in those who had suffered from heart-failure the risk was prohibitive. Pregnancy was contra-indicated in patients with active rheumatic carditis and in those whose cardiac condition was deteriorating rapidly. Intercurrent infection, especially bronchial infection, and anæmia were important and preventable causes of heart-failure. The prospect of successful pregnancy must also be considered. In the more recent series, 4 out of 5 pregnancies had yielded living children; whereas in 53 patients with advanced heart-disease who were seen too late for pregnancy to be terminated, or who were unwilling to have it terminated, only 1 in 4 was successful. Acute pulmonary congestion in patients with mitral stenosis constituted a grave emergency which was liable to develop very suddenly and often resulted in death; if it was recognised in the first trimester, pregnancy should be terminated. Valvotomy was now a possible alternative to termination of pregnancy. In addition to the clinical evidence, X-ray screening was invaluable in the early recognition of this condition.

Auricular fibrillation did not add so greatly to the risk as most earlier workers had imagined. Under favourable conditions it should not be regarded as a bar to pregnancy.

In patients who had never actually had heart-failure, but whose tolerance for exercise was much restricted, assessment of the risk was most difficult; and factors other than the severity of the heart-disease—namely, age and parity, temperament, and economic conditions—all had to be taken into consideration. The addition of an aortic lesion to mitral stenosis did not add to the risk. Opinions varied regarding the importance of cardiac enlargement, but many patients who died of acute pulmonary œdema had little cardiac enlargement.

A case follow-up in the more recent series showed that about 90% of patients who survived had no evidence of cardiac deterioration as the result of pregnancy.

With regard to treatment, Professor Bramwell believed that the two most important things were: (1) never to interfere with pregnancy in a patient with heart-failure until everything possible had been done to relieve the heart-failure; and (2) to ensure adequate antenatal supervision in every case. If heart-failure was recognised

early it responded well to treatment. In the antenatal cardiac clinic the almoner played a most important part.

It was now known that in the last few weeks of pregnancy blood-volume and cardiac output diminished, and that the strain on the heart was correspondingly reduced. There was therefore no justification, in this respect, for anticipating normal delivery by inducing premature labour or by cæsarean section. All recent work showed that in patients with heart-failure cæsarean section carried a heavier mortality than normal delivery.

New Inventions

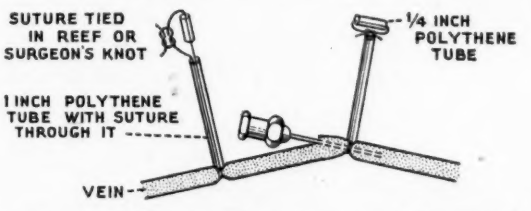
A TECHNIQUE FOR SAVING THE VEIN

FOR administering continuous intravenous fluids to children it is usual to cut down on a vein and tie it off. The method described here is designed to preserve the patency of the vein for subsequent intravenous therapy. It is based on the assumption that after a few hours' intravenous therapy little bleeding will take place, because of spasm and sometimes thrombosis of the vein.

As an alternative, it has been suggested that after a vein has been dissected out, it may simply be needled without tying; but I have found this unsatisfactory because of bleeding round the needle at the point of puncture.

The usual cutting-down apparatus is required, and also a piece of 'Polythene' tube. The polythene is cut into four lengths, two of 1 in. and two of 1/4 in. The size of the polythene tubing is not important, but no. 3 is quite satisfactory.

The vein having been exposed, two catgut sutures are placed round it in the normal way. The ends of these sutures are threaded loosely through the long pieces of polythene (see figure), and artery forceps are applied to the



polythene. A snick is made in the vein and the cannula is introduced. The two sutures are now drawn tight through the polythene, one being placed round the cannula and one distal to it (the artery forceps having been removed). One end of each suture is threaded through the smaller piece of polythene, and the suture is secured with a surgeon's knot. It will be seen that this is a modification of the Bowden-wire principle.

When the transfusion is finished, the cannula is extracted and an attempt is made to suture the vein wall. Then the sutures are cut and removed. Even if it is impossible to suture the cut in the vein, bleeding can be easily controlled by skin sutures and a pressure bandage.

The method has been applied successfully in the treatment of infants with gastro-enteritis who have required intravenous therapy. The long saphenous vein has been used. At the conclusion of the transfusion it has always been found possible to remove all the sutures without untoward effects, and there has been no leaking from the vein during the infusion. The method was also used in giving blood to a boy with acute leukæmia who had a hæmorrhagic tendency shown by widespread ecchymoses and purpuric spots. There was slight bleeding from the vein at the conclusion, but it soon stopped when a tight bandage was applied at the site of the incision.

I have had an opportunity of using this method for a second time on the same vein. A child, aged 1, was transfused during the treatment of an ulcerating hæmangioma affecting both legs. A second transfusion was needed three months later, and I cut down on the same vein. There was no real difficulty in introducing the cannula and though the lumen of the vein seemed a little narrower the transfusion was entirely satisfactory.

This method might appeal to those who have to give repeated transfusions to the same patient over several years—e.g., in congenital hypoplastic anæmia.

Senior Pædiatric Registrar, Farnborough Hospital, Kent

R. P. ARONSON
M.B. Lond., M.R.C.P.

Reviews of Books

Principles and Practice of Medicine

A Textbook for Students and Doctors. L. S. P. DAVIDSON, M.D., F.R.C.P.E., professor of medicine and clinical medicine, University of Edinburgh. Edinburgh: E. & S. Livingstone. 1952. Pp. 919. 32*s.* 6*d.*

Professor Davidson, with the staff of the medical department and clinical units at Edinburgh, has compiled a textbook embodying the teaching of this school over the past twenty years. This volume is clearly produced and simply designed. A similar descriptive pattern is used for each disease, giving concise ætiology, pathology, clinical manifestations, diagnosis, and treatment. As would be expected from this group of teachers, the physiological background is well covered and special emphasis has been laid upon treatment: it is indeed pleasant to find this aspect so well handled. The selection of material is admirable, and the student will find enough about rare diseases to serve him for his final examinations.

The printing and production is first-class. Some readers may wish for more illustrations, but they must remember that the price is remarkably low for all this volume provides. Davidson's textbook will assuredly take its place as a real contribution to British medical teaching.

Oestrogens and Neoplasia

HAROLD BURROWS, C.B.E., PH.D. Lond., F.R.C.S., formerly experimental pathologist, Chester Beatty Research Institute, The Royal Cancer Hospital, London; E. S. HORNING, M.A. Oxfd, D.SC. Melb., reader in experimental pathology, University of London, at the institute. Oxford: Blackwell Scientific Publications. 1952. Pp. 189. 30*s.*

IN addition to its main theme this volume includes an account of the chemistry of œstrogens by C. W. Shoppee and a brief summary of experimental tumour chemotherapy by W. C. J. Ross. A preliminary chapter sets out the natural sources of œstrogen from plants and animals, as well as factors controlling its supply in the body and influence in stimulating mitosis, hyperplasia, and benign and malignant growths. From observation of human and experimental conditions, the authors support the view that continuous secretion of, or exposure to, œstrogen rather than intermittent excessive output or application is the effective hormonal factor causing spontaneous or induced neoplasia. Among other special conditions cited are species and organ variation in sensitivity and response and, within the same species, differences depending on heredity and inbreeding. In the case of heritable mammary tumours of mice the effective cause is infection with the milk factor aided by œstrogen. Subsequent chapters summarise systematically knowledge of the neoplastic influence of œstrogen on its target organs. A short account of œstrogen-producing tumours is included. Numerous subheadings and cross-references help the reader to extract and to trace to source any special information required. There is a bibliography of 957 references.

Surgery of the Œsophagus

R. H. FRANKLIN, M.B., F.R.C.S., senior lecturer and surgeon, Postgraduate Medical School of London. London: Edward Arnold. 1952. Pp. 222. 42*s.*

IN this work Mr. Franklin has considered the œsophagus as a whole, and he has used his experience to draw into reasonable perspective the work in this field of the ear, nose, and throat surgeon, the thoracic surgeon, and the abdominal surgeon.

He writes with authority on the operative treatment of congenital atresia, and it is interesting to note that he has now a preference for the transpleural as opposed to the extrapleural approach. In his brief but clear discussion of the technique of œsophagoscopy he emphasises its potential dangers in incautious hands. Apart from diagnosis, endoscopy plays an important part in the removal of foreign bodies, but there are some complications which require the use of open surgery. He considers the syndrome of reflux œsophagitis, resulting from a shortened œsophagus with herniation of the stomach, in the light of recent work, and illustrates the difficulties of treatment. In the description of the operative treatment of carcinoma of the cervical and thoracic œsophagus, the absence of many figures and results make it difficult to determine the appropriate technique for each case.

The illustrations are well selected. All interested in the œsophagus should read the book, for it is a valuable contribution to a subject which is rapidly developing.

Psychology, the Nurse, and the Patient

DORIS M. ODLUM, M.A. Oxfd, B.A. Lond., M.R.C.S., D.P.M., senior psychiatrist, Elizabeth Garrett Anderson Hospital, and consultant psychotherapist, West End Hospital for Nervous Diseases, London. London: *Nursing Mirror* Publications. 1952. Pp. 114. 7*s*. 6*d*.

THIS pocket-size book should be of real help to student nurses, for it covers the syllabus in psychology for the preliminary examination for State-registered nurses. It could also be read with advantage by medical students and their seniors. After a brief outline of modern psychological theories the nurse is shown how this can be applied to the whole gamut of the *patient's* experience of illness and hospital life; so that she is led step by step to a realisation of how psychology can be of real use in understanding and ministering to her patients. The chapter on Some Special Problems is particularly good and deals with the surgical case, preparation for operation, anæsthetics, the care of the patient after operation, alleviation of pain, getting up, the use of sedatives and hypnotics, patients' questions about dying, the long-stay case, the elderly patient, and relatives and visitors. There is also a good chapter devoted to the nursing of children; the need for avoiding unnecessary separation of the young child from its mother is emphasised, though not, perhaps, forcibly enough. Some account of the good results obtained in children's wards where the mother is encouraged to visit daily and assist with settling the child down for the night might well have been included.

The whole book is written around the patient (a fact which is not suggested by the phrasing of the title) and this is specially commendable.

Nutrition and Climatic Stress

H. H. MITCHELL, professor of animal nutrition, University of Illinois; MARJORIE EDMAN, instructor in animal nutrition, in the university. Springfield, Ill.: Charles C. Thomas. Oxford: Blackwell Scientific Publications. 1951. Pp. 234. 50*s*.

THIS monograph was originally written for the United States Armed Forces, to summarise what is known of the influence of nutrition on the ability of men to endure climatic stress. The subject has an obvious bearing on the proper rationing of troops; but, as the authors point out, it has much wider implications than that. They have studied and summarised a great deal of work, published before October, 1949, on diet in a cold environment, a hot environment, and at altitude. Each section begins with the physiological effects of the form of stress under consideration, and then gives an account of what is known of the effects of this stress on nutrient requirements in animals and man. The very large bibliography refers mainly to American work, but some other sources are quoted. At the end of each section the authors have weighed up the evidence available at the time, and have offered some practical conclusions—such as that carbohydrate, especially when backed up by fat, is more effective than protein in keeping out the cold, that there is no statistical evidence to show that men voluntarily eat less protein in hot climates, that vitamin supplements seem to make little difference to tolerance of either heat or cold, and that for those going up to 15,000–17,000 feet carbohydrates are the thing, though perhaps inclined to cause trouble from flatus. A table occupying 16 pages summarises the effects recorded of treatments other than nutritional on altitude tolerance, noting the subject (whether animal or human) used, and the results. This shows at a glance which measures look promising and which may as well be given up. It also bears out the authors' contention that animal experiments do not offer a satisfactory guide to human nutritional requirements.

Human Nature

Its Development, Variations and Assessment. JOHN C. RAVEN, M.SC. London: H. K. Lewis. 1952. Pp. 226. 12*s*. 6*d*.

IN this book Mr. Raven, the author of the well-known Progressive Matrices test, gives a good introductory account of the development of human personality from birth to maturity and old age. His style is leisurely and reflective, and much of what he says will stimulate the reader to fresh thought on well-worn topics, without ever shocking the most devout disciple of William James or McDougall. The section on mental testing in its various forms, with the assessment of their value, is authoritative. An appendix deals with the statistical techniques used in psychology, but even this is palatably administered. The book includes references to further reading at the end of each section, and a useful glossary and index.

Fitness and Injury in Sport (London: Skeffington. 1952. Pp. 189. 16*s*.).—During the last few years a number of books have appeared on the subject of athletic training written by men who must have had considerable practical experience in the preparation of athletes and in the prevention and treatment of injuries. Their aim, they invariably say, is to convey to athletic trainers in simple language the essential scientific principles and their application. That is a praiseworthy ideal, but in their anxiety to emphasise "the scientific approach" they usually include details of anatomy, physiology, and pathology out of all proportion to the requirements of potential readers. The difficulty is that moderate knowledge of a subject like physiology does not equip anyone to write a simple treatise for a layman, for this is one of the most difficult of all scientific literary achievements, and demands the profound knowledge of a professor.

There are so many flowery bypaths into which a writer can stray, and Mr. S. S. Knight, who is general secretary of the Physiotherapists' Association, unfortunately strays a good deal. Thus in the chapter on Food and the Athlete he begins by saying that "there is no known or certain way of improving athletic performance by means of food," and ends 14 pages later with the remark: "it is my experience that it is what you like in food that does you good providing there is enough of it." This being so, he might as well have omitted the intervening account of food analyses and calorie values. Nor does he make up for this waste of space in the section on prevention of injuries, for practical details here are scarce. He gives a brief but good summary of modern ideas on physical fitness. His proposed course for athletic trainers would occupy four to five terms, each of 12 weeks' full-time study. It seems a lot.

Proceedings of the Third International Congress of the International Society of Hematology (London: Heinemann Medical Books. 1951. Pp. 593. £3 10*s*.).—This is the English edition of the proceedings. It does not differ at all from the American edition, edited by Dr. Carl V. Moore, reviewed in *The Lancet*, 1951, ii, 868.

Interrogation (Springfield, Ill.: Charles C. Thomas. Oxford: Blackwell Scientific Publications. 1951. Pp. 164. 35*s*.).—Captain Harold Mulbar is a senior officer of the Michigan State Police who has had much experience of getting at the truth by interrogating reluctant people. He has written, in admirably direct style, a well-informed guide to the practice of this art. Besides describing the procedures and artifices of ordinary questioning within the American police system, he gives much sensible information about the use of the polygraph, in Chicago and elsewhere, for "lie detection." His book is eminently practical, full of wrinkles and warnings, and assumes throughout that the investigator will have to produce his evidence for an American court. He is outspoken in condemning third-degree methods, which, it seems, might better be called torture and brutality.

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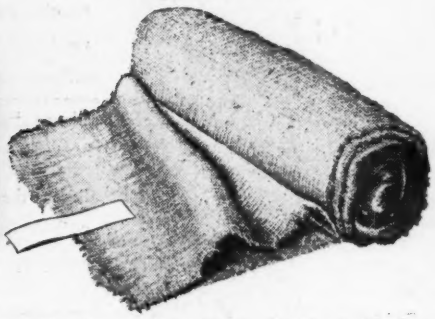

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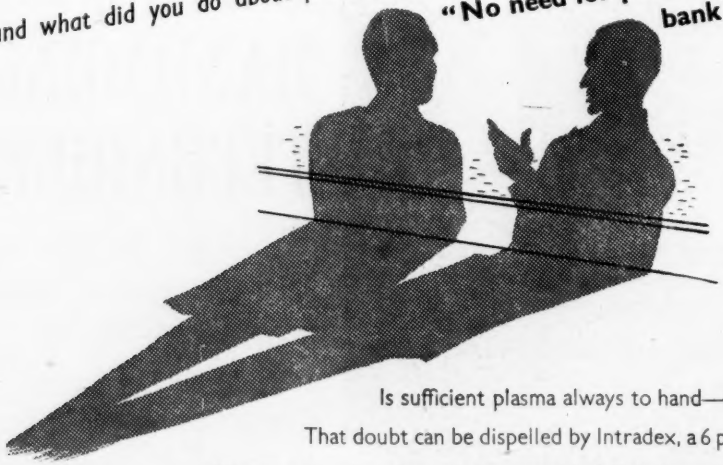

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THE LANCET

LONDON: SATURDAY, NOV. 1, 1952

Isoniazid

IT is little more than six months since the news of the antituberculous action of isoniazid (isonicotinic acid hydrazide) and some of its related compounds was announced, but much work has already been published both on the clinical and on the laboratory side. As a result, certain preliminary conclusions have been fairly well established,[1] and they can now be examined in the light of two trials which have lately been undertaken in this country. The first and larger of these is described in an interim report [2] of the Medical Research Council's tuberculosis chemotherapy trials committee; and the second, a combined clinical, pharmacological, and bacteriological investigation at Guy's Hospital, is reported in three articles which we publish this week.

For the initial stage of the M.R.C. trial, 331 patients suffering from very different degrees of pulmonary tuberculosis were divided into two groups: one group of 173 patients received isoniazid (alone), and the remaining 158 had streptomycin and *p*-aminosalicylic acid (P.A.S.). After three months' treatment the isoniazid group showed an average gain in weight of 11 lb. compared with 6 lb. in the streptomycin-P.A.S. group—a highly significant difference. On the other hand, there was little difference in the response to treatment as judged by general condition, erythrocyte-sedimentation rate (E.S.R.), temperature, and radiological appearances. The M.R.C. report concludes that "judging wholly from short-term results . . . isoniazid is a very effective drug in pulmonary tuberculosis, but given alone it is not more effective than streptomycin plus P.A.S." Further reports are promised on the results of this investigation and on the various trials of combined therapy which are now in hand.

In the meantime, the clinical trial started by Dr. JOINER and his colleagues at Guy's Hospital carries us a good deal further. It is much smaller than the M.R.C. investigation, but it has certain features which make an interesting contrast. "Clinical assessment, sedimentation-rate, and weight estimation were recorded weekly by the same physician, while specimens of sputa from each patient were examined twelve times each month, so that the criteria for a negative microscopic result were strict." The patients corresponded to group 3 in the M.R.C. trial—the chronic type of patient who lives in "unhappy symbiosis with the organism" or whose general condition is slowly deteriorating. The conditions of the trial were "those under which most patients suffering from the type of disease have to be treated today." A preliminary investigation was designed to test the effect of isoniazid given alone for a very short time. Capsules of isoniazid (250 mg. per day) were given to 12 patients for six weeks, while another 10 had identical capsules of lactose. During the six weeks several patients in the first group showed a striking improvement in their general condition: they put on weight, and the number of tubercle bacilli in their sputum fell, though the changes in E.S.R. and in X-ray appearances were slight. In the control group most patients slowly lost ground. At the end of the six weeks the 10 patients who had been having lactose, together with 1 newcomer, were started on a course of isoniazid (250 mg. daily) plus 1 g. of streptomycin six times a week: the 12 patients who had been having isoniazid alone continued as before. The progress of these two groups was then assessed for eighteen weeks in all, and they showed definite differences. Isoniazid alone, even in the rather low doses used, produced in the first four or five weeks a striking improvement in most cases; but the effect on the sputum was only temporary, for some patients were already relapsing by the fifth week, and isoniazid-resistant strains were cultured from their sputum. On the average these patients gained weight until about the twelfth week; thereafter their weight remained stationary and their clinical condition began to deteriorate. On the other hand, those treated with isoniazid plus streptomycin not only showed the same initial response but maintained their improvement throughout the eighteen weeks; their general condition got steadily better, their weight continued to go up, the E.S.R. went down to normal in most cases, and the sputum-count showed very few bacilli or none at all. Another group of 16 patients was investigated: 9 had isoniazid plus streptomycin and 7 P.A.S. plus streptomycin. Both groups showed about the same improvement in clinical condition, in E.S.R., and in sputum-count during fourteen weeks' treatment, but those on isoniazid plus streptomycin gained much more weight than the others. Both these investigations at Guy's are continuing, and further reports will be published.

The Guy's results must be analysed by methods quite different from those used in the M.R.C. trial: each group of patients, though small, served in a sense as its own control. The patients who were treated with isoniazid alone, after a rather dramatic improvement, nearly all relapsed in an equally convincing way. Most of the patients in the initial control group were going slowly but steadily downhill, but this decline stopped immediately when treatment with isoniazid plus streptomycin was started; in fact they improved for the rest of the trial. An inspection of the record of each patient who had isoniazid plus streptomycin shows the characteristic "triple response" of gain in weight, fall in E.S.R., and decrease in sputum-count. Clearly the conclusion to be drawn from this clinical trial is that isoniazid alone cannot be recommended as a treatment for pulmonary tuberculosis,

1. See *Lancet*, 1952, i, 546; *Ibid*, p. 1293; *Brit. med. J.* 1952, i, 858.
2. *Brit. med. J.* Oct. 4, 1952, p. 735.

but that isoniazid plus streptomycin promises to be highly effective. This conclusion finds support in the field of experimental chemotherapy. The pharmacological branch of the work at Guy's Hospital has dealt with the effect of isoniazid, alone and in combination, on experimental tuberculosis of the cornea in rabbits and mice. The methods used have already proved valuable in examining the merits of promising antituberculous drugs.[3] On another page of this issue, Dr. GOULDING and Professor ROBSON describe how the development of corneal tubercles in mice inoculated intracorneally with a virulent strain of *Mycobacterium tuberculosis* was completely arrested while the mice were having isoniazid; but the lesions appeared after the usual interval when the drug was stopped. With streptomycin alone the disease was almost entirely prevented, though occasional lesions appeared even during treatment; and when the streptomycin was stopped, it was uncommon for lesions to develop later. But a combination of isoniazid and streptomycin was much more efficient, and no lesions developed at all either during or after treatment. A combination of P.A.S. and isoniazid was no more effective than isoniazid alone.

In the third paper of this series Professor KNOX, Dr. KING, and Mr. WOODROFFE describe their work on the in-vitro action of isoniazid on the tubercle bacillus. They found that the apparent sensitivity of *Myco. tuberculosis* to isoniazid in Dubos liquid medium depended on the length of incubation of the culture, and for that reason a standard period of incubation was essential. When the sensitivity was read after incubation for fourteen days or less, growth was usually inhibited by a concentration of 0·01 μg. per ml. (1 part in 100 million). With longer periods of incubation, growth was eventually seen in tubes which originally contained up to 1·6 μg. per ml. They have shown that this unstable end-point is the resultant of two processes: (1) an inactivation of the drug, even in uninoculated Dubos medium at 37°C; and (2) a selection of organisms with increased resistance to the drug. In another article in this issue, Dr. MITCHISON reports a similar inactivation of isoniazid in uninoculated Dubos medium at 37°C, and a comparable shift in the end-point in the inoculated medium. Commenting on the difficulty of deciding with certainty whether a drug is mainly bactericidal or bacteriostatic, KNOX and his colleagues say that the in-vitro action of isoniazid was profoundly modified by quite small changes of temperature, and they suggest that a rise of temperature from 37° to 40°C increases its bactericidal action. They think that this is no mere test-tube phenomenon, for isoniazid has a miraculous effect on toxic patients with high temperatures, and, moreover, GOULDING and ROBSON found interesting differences in the action of isoniazid on animals with different body-temperatures. The laboratory evidence, though not yet complete, suggests that isoniazid alone, in vitro, and in concentrations close to those which inhibit growth, is bacteriostatic rather than bactericidal; that resistant variants can be quickly and easily produced; and that a combination of isoniazid and streptomycin is more nearly bactericidal and delays the development of strains resistant to both drugs.

All this evidence points to the same general conclusion: the initial attack of isoniazid on the tubercle bacillus is perhaps the most powerful of all the weapons yet discovered, but the drug must not be used alone except for very special reasons. Attention is now being concentrated on the urgent question of how best to combine it with other drugs. The final answer is most likely to come from extensive clinical comparisons of the kind started so promptly by the M.R.C.; but valuable information can be gained and a great deal of time saved by smaller combined investigations on the Guy's pattern.

Management of Disseminated Sclerosis

NOWADAYS associations of patients suffering from a particular disease, and of those interested in their welfare, are springing up, and doing good service by passing round useful information. One such association, the National Multiple Sclerosis Society of America, was founded in 1946 by a group of physicians and patients to stimulate research into the demyelinating diseases in general and disseminated (multiple) sclerosis in particular. This society, which has already sponsored some thirteen research projects in university hospital centres in the United States, has now published five important manuals by Dr. EDWARD E. GORDON, of the department of physical medicine and rehabilitation of the Bellevue Medical Center, New York University. One is addressed to doctors, while the other four, addressed to patients, are home programmes for those confined to bed, those who can manage life in a wheel-chair, those able to walk with mechanical aids, and those able to walk alone.[1]

The striking thing about these publications is their hopeful and confident attitude towards a disease which we in England are apt to regard despondingly. Dr. CORNELIUS H. TRAEGAR, medical director of the society, in his foreword to the home programmes points out at once that the life-expectancy of these patients does not differ much from that of normal people, and is a great deal longer than that in most other chronic diseases. Instead of speaking vaguely of "remissions of varying duration" he declares roundly that great numbers of patients, at first severely disabled by the disease, have recovered spontaneously, either wholly or in part. These are no mere encouraging tales for patients; much recent work supports them[2]; and Dr. GORDON reiterates them in his introduction to the manual[3] addressed to doctors, and adds this important statement:

> "Since doctors are not prophets it cannot be predicted that the termination of a given acute episode is not the last of the disease for a given patient. When a patient with multiple sclerosis recovers from an acute episode, the doctor, for the purpose of rehabilitation, must *promptly* and *enthusiastically* begin a programme of rehabilitation."

This manual discusses in detail how the patient may be taught to live his life in spite of his handicaps, by exploiting his remaining powers. It is a programme demanding hard work from both patient and doctor. The chief enemy of the patient's life is infection—bronchopneumonia, bladder sepsis, bedsores—and the strong ally of infection is inactivity. The doctor's duty, then, is to get the patient on the

3. Rees, R. J. W., Robson, J. M. *Brit. J. Pharmacol.* 1950, **5**, 77.

1. Published by the National Multiple Sclerosis Society, 270, Park Avenue, New York 17, N.Y., U.S.A.
2. See *Lancet*, 1952, i, 1196.
3. Multiple Sclerosis: Application of Rehabilitation Techniques.

move and keep him moving. The first thing to do is to assess the degree of disability; and in Dr. GORDON's view this is no matter of getting a rough general idea.

The manual includes a chart which can be used for grading spasticity, strength, and range of movement of the joints of the upper and lower limbs, neck, and trunk. The completed chart serves for comparison at the next examination. Spasticity is of particular interest, not only because it varies according to the position and previous activity of the patient but also because it is increased by anxiety. If the patient's emotional difficulties—whether these preceded the appearance of his disorder or are its outcome—can be resolved, his general tension may be much reduced and with it his spasticity. Other methods of lessening spasticity include gentle stretching, heavy exercise of the unaffected muscles, and in a few cases special braces designed to increase the patient's skills. Weak muscles are easily fatigued, and in a series of trials their power may progressively decline. Such a decline can be recorded in figures, as 4→3→2→1, where 5 is normal, 4 good, 3 fair, 2 poor, and 1 a trace or a slight muscular contraction with no motion. In addition, it is important to note contractures, and any weakness due to overstretching in the antagonists of contracted muscles. The degree of ataxia and incoördination may be difficult to evaluate if obscured by muscular weakness or spasticity; Dr. GORDON thinks it more useful to concentrate on the activities of daily living. Thus a positive Romberg test gives information about standing balance; but it is more useful to know whether the patient can stand safely with his feet a little apart and his eyes looking ahead than that he falls when he has his feet together and his eyes shut.

Activities depending on body position include, for example, ability to roll to either side in bed, to sit up, to get out of bed or out of a chair and stand, to sit down in a chair or a wheel-chair from the standing position, and to get down on the floor and up again. Those depending on reach and grasp include ability to dress, tie the shoelaces, brush the hair, eat with a knife and fork, write, telephone, and turn a tap. For those using a wheel-chair progression depends among other things on the ability to get into and out of the chair, propel it, and move from it to the toilet seat and back again; while for those walking with or without crutches progression depends on the ability to walk forwards, backwards, and sideways, to open and close a door, and to go up and down stairs. These and similar activities are charted, with the date on which each is achieved—a great encouragement to the patient.

The reablement programme is energetic and directed to clearly defined ends. The patient, Dr. GORDON reminds us, expects to find in his doctor a strong and resourceful counsellor. Objectives will differ according to the patient's physical status—whether he is confined to bed, restricted to a wheel-chair, able to walk with aids, or able to walk alone. If he is bedfast and cannot sit, it is pointless to begin by teaching him to use a spoon: he must first learn to sit up in bed. If he can sit in a wheel-chair he must learn to reach and grasp before he learns to walk.

To take a specific example, suppose a patient who can sit up is clumsy at carrying food to his mouth. The first step will be to study the muscle-groups which subserve grasp, supination, flexion on the elbow, and abduction of the shoulder, and to treat them for any weakness, spasticity, or contractions which may be present; the second step is to give the patient integrated training in performing the whole motion under realistic conditions. If incoördination is also present, then training in coördination must be included. If these measures produce no change for the better, it is time to think of mechanical devices to help him over the difficulty—e.g., aids for grasping, and for lifting and stabilising the arm.

The doctor must not overwhelm the patient with responsibility for his entire course of training: he must present him with attainable objectives, one or two at a time. The patient has his own responsibility—to carry out faithfully the exercises the doctor prescribes; and details of how he is to do it, and what simple equipment he will need, are set out in the home programmes.

A simple pulley with two stirrup-shaped handles can be used to exercise the arms; and if the patient cannot grasp the handles he can wear a glove which straps the fingertips down to a wristband and so holds the hand closed. One stirrup can be replaced by a child's bucket holding graded weights, and the arm can then be exercised against weight resistance. Coördination can be practised by moving small objects to numbered squares on a chessboard, and by the use of Montessoric apparatus designed to give practice in fastening buttons, tying laces, or fastening hooks and eyes.

We are too apt, in dealing with these patients, to think of failure of function in purely structural terms, forgetting that the conscious person in charge of the structure can find ways of getting round a difficulty, and moreover that the nervous system is wonderfully adept in spreading its tasks among the available neurones, much as a hospital matron during a staff epidemic deploys her remaining nurses. The patient with disseminated sclerosis can and should work at his own reablement; and Dr. GORDON is not among those who think heavy exercise will harm him. He points out that studies of cases of lower-motor-neurone injury have shown that fatigue does not interfere with axon regeneration.

Mechanical aids may be used in two ways—either to start a patient off in acquiring the next skill (thus a crutch and leg-irons may help to start a patient walking, though he may be able to discard them later), or as a substitute for a power finally lost.

Dr. GORDON advises on crutches and crutch gaits, leg braces, night splints for hands, wrists, and legs, types of wheel-chair, sling suspensions which allow patients to use weak hands, devices for holding spoons and knives and forks, a knife and fork conjoined, long spoons and forks conjoined at an angle, thick-handled pencils, cups with lids perforated so that the patient can drink without fear of spilling, pivoted arm-rests, long shoe-horns, supported telephones, lazy-tongs, and many other simple and useful tools to help these patients to help themselves.

The whole tone of these manuals is inspiriting, and should start many doctors thinking afresh about the care of their patients with this disease. As Dr. GORDON puts it, "the techniques and devices developed in the field of rehabilitation can be employed so that the patient's life may be made productive; if not productive, self-dependent; and if not self-dependent, at least tolerable." The National Multiple Sclerosis Society send the appropriate manuals to doctors or patients without direct charge, though they mention that subscriptions to further their work will be welcome.

Control of Filariasis

FILARIASIS, due to *Wuchereria bancrofti*, is a scourge of most of the hot and damp parts of the tropics; but it can now be hopefully attacked in two ways—by destroying the worms with dimethylcarbamazine ('Hetrazan,' 'Banocide') or by destroying the mosquitoes (which transmit it) with insecticides. Progress on these lines is now being made in different parts of the world. On another page a correspondent describes what is being done in Tahiti, where a joint American and French team are studying modern methods of control.[1] In that island, it seems, a third of the population over 5 years old carry microfilariæ in the blood, and 8–20% of the men between 30 and 50 years of age suffer from elephantiasis. Small experimental areas each containing about 60 persons were treated by various combinations of dimethylcarbamazine, general sanitation, and D.D.T. The dimethylcarbamazine was given as 2 mg. per kg. body-weight three times a day for seven days. (This schedule must have been difficult to supervise to ensure that all doses were actually taken.) A year later the percentage of people with microfilariæ had fallen from 34 to 20 and the microfilarial density in those remaining positive had fallen to less than 10% of its original level. The treatment, however, did not reduce the frequency or severity of clinical filariasis. The drug is said to have been well tolerated, though more than half the patients suffered transitory reactions on account of the compound itself or of allergic reactions to the microfilariæ which had been destroyed. Presumably the people were conscious of the dangers of the infection and so were prepared to undergo some discomfort in order to be rid of it. The other measures, of sanitation and of spraying with D.D.T., did not have an effect upon microfilarial rates or densities in the course of a single year, though they probably reduced the mosquito population. These are measures which act slowly, and their full benefit cannot be estimated soon.

A trial of dimethylcarbamazine which was restricted to a single village of about 700 persons has been reported from the Gambia in West Africa.[2] A preliminary survey by blood films taken at night showed that 40–54% of the people over 10 years old carried *Mf. bancrofti*, but only 6 (about 1%) showed signs of elephantiasis, or hydrocele. Dimethylcarbamazine, 5 mg. base per kg. once daily for five days, was administered under strict supervision to the microfilaria carriers. A year later 64% of the treated carriers had become free of microfilariæ and the total microfilaria count was reduced by 94% (9% of people previously free from microfilariæ now showed them). Some of the patients who had been treated with the drug had also contained *Mf. perstans*, and a year later the total microfilarial count for *perstans* had been reduced by 90%. Although *perstans* is non-pathogenic and so unimportant, this demonstration of the action of dimethylcarbamazine on it is interesting. Unfortunately many of the persons receiving the drug experienced minor toxic reactions such as headache, nausea, or anorexia. Very few of these were sufficiently severe to have been noticed by inpatients at a hospital; but among healthy villagers, who were not much conscious of filariasis or its sequelæ, they were enough to cause great reluctance to complete the course of treatment. In villages where the doctor was not personally known and trusted, they would make such mass-treatment impossible. In this investigation it was concluded that dimethylcarbamazine (in this dosage) had been effective in greatly diminishing the potential transmission of the infection, but its unpopularity and expense would be great handicaps to widespread use.

From East Africa comes the annual report of a research unit set up in 1949 by the Colonial Medical Research Committee under the High Commission of East Africa for the study of filariasis.[3] This report covers a wide field. Much attention has been devoted to the optimum dose schedule for dimethylcarbamazine and to its absorption, blood concentration, and excretion. Two field trials have been begun, one at Kyela near Lake Nyasa and another on the island of Ukara in Lake Victoria. In the first a total dose of 70 mg. per kg. (divided into two-hourly doses) was given during a single day. This caused much vomiting; and for practical use the report recommends a dose of 0·5 mg. base per kg. per hour so that a total of 35 mg. per kg. is given during three days. (This was the dose which was used for most of the patients on Ukara.) Fifteen months later the total microfilaria count at Kyela had been reduced by 96% although 80% of the patients still contained a few microfilariæ. The results on Ukara were similar, though the period of follow-up is not yet so long. The expense of such treatment would, however, be a serious obstacle to its wide use. As was expected, dimethylcarbamazine had no effect on clinical filariasis, hydrocele, or elephantiasis. Trials were also made of an antimony compound called 'Protostib,' which is pentavalent N-methyl glucamine antimoniate. This was given intramuscularly to 164 patients in doses as high as 20 ml. of the 30% solution daily for ten days. In 4 cases the patient developed mild and transient exfoliative dermatitis, but none the less the treatment seems to have been popular among the local inhabitants. There has not yet been enough time to evaluate the full effect of this treatment, which is designed to destroy the adult worms; but after four months there was a diminution of the total microfilaria count by 50–80% and the general outlook is promising. However, this treatment is too expensive and too toxic for use in field eradication work.

During filarial surveys, microfilariæ of *bancrofti* were found in 2 infants of less than 12 months old, who must be the youngest carriers yet recorded. Attempts to facilitate the diagnosis of the infection by antigens—e.g., by skin reactions or complement fixation—were unsuccessful; both these tests were unreliable. Dimethylcarbamazine has also been used to treat onchocerciasis (a disease which is important because of the blindness it causes); but a more effective way of controlling this infestation seems to be the eradication of the vectors, *Simulium neavei* and *S. damnosum*, by treating infected streams with D.D.T.

Altogether the present work on filariasis is remarkable for its wide geographical distribution, its diversity, and its promise of ultimate (though perhaps delayed) success.

1. Beye, H. K., Edgar, S. A., Mille, R., Kessel, J. F., Bambridge, B. *Amer. J. trop. Med. Hyg.* 1952, **1**, 637.
2. McGregor, I. A., Hawking, F., Smith, D. A. *Brit. med. J.* Oct. 25, 1952, p. 908.
3. Filariasis Research Unit Annual Report 1951. East Africa High Commission.

Annotations

NOBEL PRIZE

Prof. Selman Waksman, director of the Rutgers University institute of microbiology, New Brunswick, has been awarded the Nobel prize for medicine and physiology for the discovery of streptomycin. This discovery, in 1943, was the outcome of work begun in 1915, when Professor Waksman found in soil the actinomycete later named *Streptomyces griseus*. He has since developed neomycin from *Streptomyces fradiæ*.

TRANSPYLORIC PROLAPSE OF THE GASTRIC MUCOSA

RADIOLOGICAL examination sometimes shows an inconstant filling defect in the base of the duodenal cap, resembling a mushroom, cauliflower, or umbrella, due to linear folds of gastric mucosa passing through the pylorus and, as it were, pouting into the duodenum. This pouting is inconstant in shape and it may be present only during antral contraction; serial radiographs show a continually changing pattern that can be further modified by pressure over the antrum or duodenal cap and by altering the position of the patient.

As long ago as 1923 Forsell [1] drew attention to the mobility of the mucosa on the muscular wall of the stomach and to its independent changes in shape. Soon afterwards it was shown [2] that prolapse of the gastric mucosa through the pyloric sphincter into the duodenum could be recognised radiologically and confirmed at operation. As often happens with radiological appearances, increasing familiarity has been followed by reports showing an increasing proportion of positive findings. Thus, Rees [3] found 4 instances in 3000 patients, Scott [4] just over 1% in 1000 patients, Ferguson [5] 7% in nearly 300 patients, and Rappaport et al.[6] 15·5% in 1000 patients. In this country New [7] has reported this change in nearly 3% of 1700 patients, while in Belgium Wellens and Spyckerelle [8] found it in 5% of their patients. Rappaport et al. cite a case in which characteristic appearances were seen in only one of fifteen radiographs of the pyloric antrum and duodenum; and such inconstancy suggests that sometimes the normal is being confused with the abnormal.

Manning and Gunther [9] described six cases of mucosal prolapse examined post mortem. In none of these did this disorder account for death, though in 1 gastric hæmorrhage was a contributory factor. In 5 cases the antral rugæ were thickened, hypermobile, and redundant, with microscopic evidence of mild to severe chronic inflammation in the mucosa or submucosa. In 1 case congestion and multiple small superficial ulcerations were present on the prolapsed folds. Thickening of the pyloric muscular ring with apparent narrowing of the pyloric canal was seen in 4 of the 5 cases examined microscopically. In 4, the entire circumference of the pyloric mucosa was involved in the prolapse; the other 2 showed only tongue-like projections.

Norgore and Schuler,[10] described 2 cases treated by partial gastrectomy on account of vomiting and epigastric pain made worse by solid foods. Levin and Felson [11] found 18 cases of prolapse in 100 patients with no digestive complaint. Of the 1000 patients examined by Rappaport et al., only 28 had no gastro-intestinal symptoms, and of these 3 showed mucosal prolapse; of 118 with lower abdominal symptoms only 16 had mucosal prolapse; while of 854 with upper abdominal symptoms 136 had prolapse. The proportional differences between the three groups are small. Of the 155 patients with mucosal prolapse 91 showed one or more further definite abnormalities in the gastro-intestinal tract; hiatus hernia, cholecystitis or gall-stones, and peptic ulcers were the most common. Of the remainder 39 had chronic recurrent dyspepsia consisting of periodic epigastric fullness, generally after heavy or spicy food, flatulent discomfort, and heartburn; discomfort was felt soon after a meal and actual pain was rare. Bicarbonate of soda gave much relief, but aluminium hydroxide gel gave little. Gain of weight before the onset of symptoms was not uncommon. All these 39 patients had notable evidence of neurosis, and said that their symptoms were often induced by emotional disturbance. 4 patients (not all in this series) were treated surgically, but relapsed afterwards. A further 25 patients in the series with positive radiological findings had only transient epigastric discomfort or no upper abdominal symptoms at all. Gastric analysis and gastroscopy gave no definite information. As in New's [7] series the appearances were more often seen in men than in women, and were most usual in the fourth and fifth decades.

It thus seems that prolapse of the gastric mucosa into the duodenum may give rise to either no symptoms at all or to mild symptoms, especially in the neurotic. There is no evidence that this disorder is a hazard to the patient's life.

GENERAL PRACTICE IN SCOTLAND

THE Scottish Medical Practices Committee issued its fourth report this week. The committee welcomes a substantial increase in the number of principals in practice: on July 1, 1952, there were 2379 doctors providing general medical services in Scotland, compared with 2328 a year before; and of this year's total 2127 also provided maternity medical services, as against 2063 in 1951. The latest figures show that the average number of patients per doctor in Scotland is about 2150; the corresponding figures for England and Wales at the beginning of this year give an average of about 2400 per doctor, but, as the annual report of the Ministry of Health [12] points out, the total number of patients on doctors' lists is still inflated by duplicated and out-of-date entries. Moreover the Scottish average is reduced by the figures for the isolated areas where a doctor is needed even though his list is very small; the doctor on the island of Coll, for example, has a list of only 209. There are many places, chiefly in the industrial areas, where doctors still have more patients than the committee thinks desirable, and the report hopes that when the proposed changes in the distribution of the central pool come into effect, new doctors will find it easier to gain entry into established practices in these areas.

On the question of ways into general practice, the evidence before the committee in the past year has strengthened its view that "the likeliest method for a young doctor to establish himself in general practice is to be assumed into partnership, preferably after an initial period of assistantship." Doctors who have set up new and independent practices (even in districts which had been included in the list of underdoctored areas) have often, in the committee's experience, had a hard time of it, and the proportion of doctors who apply to start practice on their own account is decreasing. The committee granted 148 applications for admission to executive councils' lists during the year under review, and only 31 of these were from doctors going into independent practice, whereas in the previous year the proportion was 20 out of 74.

Scottish executive councils advertised 25 practice vacancies during the year, and they received over 500

1. Forsell, G. *Amer. J. Roentgenol.* 1923, **10**, 87.
2. Eliason, E. L., Pendergrass, E. P., Wright, V. W. M. *Ibid*, 1926, **15**, 295.
3. Rees, C. E. *Surg. Gynec. Obstet*, 1937, **64**, 689.
4. Scott, W. G. *Radiology*, 1946, **46**, 547.
5. Ferguson, I. A. *Ann. Surg.* 1948, **127**, 879.
6. Rappaport, E. M., Rappaport, E. O., Alper, A. *J. Amer. med. Ass.* 1952, **150**, 182.
7. New, P. F. J. *Brit. J. Radiol.* 1951, **24**, 441.
8. Wellens, P., Spyckerelle, G. *J. belge Radiol.* 1949, **32**, 157.
9. Manning, I. H. Gunther, J. U. *Amer. J. Path.* 1950, **26**, 57.
10. Norgore, M., Schuler, I. J. D. *Surgery*, 1945, **18**, 452.
11. Levin, E. J., Felson, B. *Radiology*, 1951, **57**, 514.

12. See *Lancet*, Oct. 11, 1952, p. 729.

applications. There were not, of course, over 500 doctors looking for a permanent place in general practice, because many were applicants for more than one vacancy; but nevertheless "the Committee have been concerned to note the difficulty still experienced by many doctors anxious to become settled as principals." Roughly 70% of the applicants were already engaged in general practice, either as assistants or as principals who sought to change the type or locality of their practice; 10% were hospital doctors; 10% were doing locum appointments of various kinds; and the remaining 10% were employed in the public-health service, Government medical services, and comparable work. A further analysis of 21 of the advertised vacancies shows that 17 of them went to doctors under the age of 40. The corresponding committee for England and Wales observed last year [13] that, in the matter of openings in general practice, "the scales are now more than balanced fairly in favour of the younger doctors"; and the position in Scotland justifies the same remark.

SALINE INFUSION

IN his challenging letter on p. 883, Dr. Murphy raises the question whether we are allowing patients to die for want of adequate saline infusion. He dismisses the dangers of overloading the circulation as a bogy, at any rate in patients with no primary cardiac or renal failure. He points out that normal people can readily get rid of large loads of salt and water; and he might have added that normal people can withstand infusions of saline, plasma, or blood up to 2 litres without any notable symptoms.[14] The weakness of his argument lies in the implied transfer of the homœostatic powers of a healthy person to one who has just sustained a major operation. There is clear evidence that in the post-operative period both water and salt are excreted abnormally slowly,[15] and the patients are in the grip of a major metabolic disturbance.[16] Pathologists are familiar with the sodden lungs of patients exposed to excessive intravenous saline, even when that unfamiliar tool, the stethoscope, has not revealed pulmonary œdema during life.

The crux of the matter would seem to lie in accurate diagnosis of salt depletion before beginning treatment. There is no excuse for saline treatment as a routine post-operative measure, and little doubt that saline infusion can be dangerous to a patient who is not salt-depleted. In the salt-depleted patient, on the other hand, saline infusions are well tolerated and beneficial, and the amount of saline required to restore circulation and well-being may, as Dr. Murphy claims, be very large. The diagnosis of severe salt depletion must be based on a history of salt loss (usually from the alimentary tract, but sometimes in the urine, as in diabetic coma) and on clinical dehydration and collapsed veins. In severe salt depletion the serum-sodium is low, and chloride is often absent from the urine. Given the clinical context and the signs of serum-sodium depletion, it is safe to press on boldly with saline infusion. The deficiency of sodium associated with severe dehydration is of the order of 1000 m.eq., representing some 60 g. of salt. Saline infusion on this scale is only justified by an accurate previous assessment of the deficit. In patients with acidosis about half the necessary sodium should be given as lactate; and potassium should also be given during massive saline infusion, which increases the urinary excretion of potassium. Potassium should be administered by mouth when possible; but the greatest problems of electrolyte replacement arise in patients with paralytic ileus or fistulæ, and for these intravenous potassium may be needed. Cooke and Crowley [17] have lately given a practical account of the management of electrolyte loss from the gastro-intestinal tract.

So far as electrolytes are concerned, improved post-operative management depends on taking more care with the individual patient and adjusting our treatment to his needs, so far as we can discover them.

ONE MAN'S MEAT

IN the days when travel was possible, one could leave one's customary diet of bread and tea to travel north and eat scones and haggis. One could then cross the sea for the pastries and dairy produce of Denmark, go south for the crêpes and snails of France, and on for the potatoes and beer of Germany, and then either east for the rice and chow-mein of China or west for the breakfast cereals and soft drinks of the U.S.A.; one could even taste the corn and fat-back of the southern States before passing into Mexico to gorge on tortillas and chillies. Nevertheless, these foods of civilised peoples are all much of a muchness. It is among less civilised races that diet becomes either very monotonous or very varied: very monotonous if only one foodstuff is to be had throughout most of the year (as with Eskimos), or very varied if one downs almost anything that can be chewed and is not subject to a taboo.

On Oct. 18 the Nutrition Society devoted a day to the discussion of unusual foods. Some would have us eat grass (euphemistically called leaf protein), some green algæ, some synthetic fats made from coal. Mr. W. A. P. Black, PH.D., stated the case for seaweed. To the analyst this seems an excellent food: 15% protein, some fat, a high mineral content, a liberal supply of vitamins including apparently vitamin B_{12} (or cyanocobalamin as we now should call it), and plenty of agar to add bulk. Furthermore it contains not only 1% iodine but also 3:5-diiodotyrosine ready-made for the thyroid. However, the dietists present were not told how to cook it. Should it, one wondered, be fried in deep fat, or perhaps be chopped, boiled, and served with grated cheese? Mushrooms and toadstools were championed by Mr. J. Ramsbottom, D.SC. In any country other than this such fungi would not be classed as an unusual food; and the widespread fear of them is not justified, since only *Amanita phalloides* and two related types are poisonous. Mushrooms are not rich sources of nutrients, and only the epicure would pay the price of 16*s.* a pound which was reached in the war. Probably Dioscorides was right in classifying mushrooms into those which were poisonous and those which were not, and leaving it there. After this vegetarian start the meeting passed to a meat dish with an authoritative discourse on insects as food from Mr. W. S. Bristowe, D.SC. A zoological blind eye was apparently turned on this address, which was more about spiders than insects. The important point was that "insects" taste nice: the flavour of the lizard is musty, but a giant water-bug tastes like a strong gorgonzola, only more so; the so-called "bird-eating" spider, without its jaws and toasted, tastes like excellent marrow, and there is quite a lot to be said for boiled locusts. The question of taste was obscure to Mr. A. L. Bacharach, who thought that the "meaty" flavour was always accompanied by a backbone and that invertebrates always tasted vegetable.

Mr. F. Aylward, PH.D., described investigations by the Massachusetts Institute of Technology into the excellent dietary of the inhabitants of Central America; the plants eaten by the Mexicans are much richer in nutrients than are those in the U.S.A. Dr. H. M. Sinclair then took the meeting to visit the Eskimos and Canadian

13. *Ibid*, 1951, ii, 982.
14. Sharpey-Schafer, E. P., Wallace, J. *Brit. med. J.* 1942, ii, 304.
15. Coller, F. A., Campbell, K. N., Vaughan, H. H., Iob, L. V., Moyer, C. A. *Ann. Surg.* 1943, **119**, 533.
16. Wilkinson, A. W., Billing, B. H., Nagy, G., Stewart, C. P. *Lancet*, 1949, i, 640.
17. Cooke, R. E., Crowley, L. G. *New Engl. J. Med.* 1952, **246**, 637, see *Lancet*, Sept. 20, 1952, p. 574.

Indians. From the dietary of seal and fish consumed by Eskimos a century ago he calculated the aliments and nutrients obtained. It seems that they fared very well provided they could catch the seals, and there was certainly no deficiency of vitamins. Although the diet was very rich in protein, rich in fat, and poor in carbohydrate, there was no reason why it should give rise to ketosis; but it was perhaps surprising that arteriosclerosis was so rare. Indeed, the other diseases of civilisation (such as diabetes mellitus, tuberculosis, appendicitis, cancer, and dental caries) were extremely rare among the Eskimos, and still are in those few places where they have not been contaminated by white men. Importation of the white man's diet brings with it his diseases. This has been particularly obvious in the case of the Indians: the Crees visited by Dr. Sinclair in 1943 used to be hunters subsisting on an excellent carnivorous diet; but now their dietary is mainly bannock, white flour, lard, and sodium bicarbonate, mixed together in haphazard proportions. This fate has also overtaken the Australian aborigines, whose food was discussed by Mr. G. H. Bourne, D.SC. Now they consume white flour and sugar, whereas previously they subsisted on various animals ranging from marsupials and buffalo to moths and caterpillars. In the last paper, Dr. B. M. Nicol discussed the protein in the diet of the Isoko tribe of the Niger Delta. Here again was a tribe largely carnivorous in habits who consumed fish, snails, snakes, and lizards; but to these they added yams, cassava, palm oil, and palm wine.

It is perhaps unfortunate that there was not enough time to correlate the dietaries of these different peoples with the incidence of diseases among them: this is a subject of great interest to which far too little attention has been paid. Sometimes dietary and culinary habits are dictated by expediency: the Eskimos obtain large amounts of vitamin C from the skin and stomach contents of the animals they eat, and most of their food is eaten raw. These habits arise, not from a knowledge of dietetics, but from the necessity of eating as much as possible of the slender food-supply and from the difficulties of cooking in an igloo. Physiologists might well study the Eskimo further, particularly when such interest is being taken in survival under Arctic conditions. And some of the problems appear to concern physicists; for Dr. Sinclair mentioned that the Yakuti are alleged to be able to eat 36 lb. of beef and 18 lb. of butter (about 120,000 calories) in under three hours. Throughout this interesting discussion it appeared that there were serious gaps in our knowledge, severe limitations in our choice and enjoyment of food, and a surprising difficulty in describing tastes. It is doubtful if we have advanced much beyond the problem of cooking a snark.

PORPHOBILINOGEN

PORPHOBILINOGEN, the Ehrlich-reacting material which appears in the urine of acute porphyria, has long been one of the veiled figures which haunt the course in clinical pathology. It has some diagnostic and prognostic interest to the clinician, but its main importance is its association with the whole subject of porphyrin chemistry. In this connection the biochemist has had it on the list of "wanted" substances for some time, and now a particularly elegant piece of research by Westall [1] has culminated in its crystallisation. This is a considerable feat, since the insolubility of porphobilinogen in most non-aqueous solvents and its instability make it very unmanageable. Its isolation has been made possible by the development of ion-exchange resins as chromatography media, and by the observation that porphobilinogen can be precipitated from urine by mercuric acetate.

Porphobilinogen has usually been thought to give rise, under certain circumstances, to uroporphyrin. This view, recently contested by Hawkinson and Watson,[2] has now been proved correct. The change takes place on boiling at any pH between 1 and 8, the largest yield being obtained in 0·5*N* HCl. On standing at room-temperature, porphobilinogen is slowly converted to the reddish non-porphyrin pigment, porphobilin.

The importance of any substance which can give rise to porphyrin lies in the possibility that it may be a natural intermediate in porphyrin synthesis. The number of these known or suspected precursors is growing—recent work by Weatherall [3] at the London Hospital, for instance, strongly suggests that in the lead-poisoned rabbit all the urinary porphyrin is present as precursor at the moment of excretion. The nature of porphobilinogen has been the subject of several guesses. The most popular has been that it is a monopyrrole or more probably a dipyrrole—possibly a dipyrrylmethane of the type postulated theoretically as an intermediary in porphyrin synthesis. This guess can now be tested. Whether porphobilinogen in the urine is an overflow of a normal metabolite which is produced in excess, or whether it is in itself an abnormal material, cannot yet be settled. But some interesting light on porphyrin synthesis and on congenital errors of metabolism is likely to come from further work on porphobilinogen which is now in progress.

1. Westall, R. G. *Nature, Lond.* 1952, **170**, 614.
2. Hawkinson, V. H., Watson, C. J. *Science*, 1952, **115**, 496.
3. Weatherall, M. *Biochem. J.* (in the press).

FIFTY YEARS OF MIDWIFERY

IN 1900, out of every 300 London mothers giving birth, one died; in 1950 one died out of every 1880. The first Midwives Act, which set in train the events which led to this extraordinary change, was passed in 1902; and on Oct. 28 the Royal College of Midwives entertained the Minister of Health at their celebration of the golden jubilee of this momentous piece of legislation. Before it was passed, as the *Manchester Guardian* (Oct. 27) recalls, women who could not afford to pay a doctor to attend them in confinement relied on the Gamp, who was sometimes kindly and experienced, but all too often cut to the pattern of the immortal Sarah. It is true that in 1872 the Obstetrical Society of London, after failing to persuade the Government to take action, started their own examination for midwives, though they could not compel women practising midwifery to take it; and when the Midwives' Institute, now the Royal College of Midwives, was founded in 1881 it immediately undertook the further training of women who held the Obstetrical Society's certificate. It took eleven years, and all the money the institute could raise, before the Act making it an offence for an uncertificated woman to attend a delivery (unless she was working under a doctor) reached the statute-book. The official qualification became the certificate of the Central Midwives Board; and after 1910 the board recognised the institute as a lecture centre for pupil and postgraduate midwives. The increasing work of the institute in the interests of maternity and child welfare led to its change of status, in 1941, to the College of Midwives, and in 1947 to the royal recognition.

Today the mother has many services at her command. The midwife, however, remains a key figure in the team, and may fairly take much credit for the fall in the maternal mortality-rate. Nor has her part been small in the saving of infant lives; since 1902 the infant-death rate has fallen from 133 per 1000 live births to 23 per 1000 in the third quarter of this year—the lowest figure on record.

THE ASSISTANT EDITOR OF THE LANCET

WITH great regret we announce that Dr. Edward Clayton-Jones, because of continuing ill health, has resigned. The Proprietors have appointed Dr. Ian Douglas-Wilson to succeed him as assistant editor from Nov. 1.

Special Articles

THE GROUP INTERVIEW IN THE SELECTION OF MEDICAL STUDENTS

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THE suggestion has several times been made (Biesheuvel 1947, Millar 1948, Brinton 1951, Warburton 1952) that the group interview might be adapted for use in the selection of medical students, and it may, therefore, be of interest to record some experiments with it at University College, London.

It is a generally accepted principle that candidates should be interviewed before being offered a place in a medical school. This implies the recognition of the great importance of personal qualities in a doctor, and the assumption that these can be assessed by interview. The unreliability of the conventional interview has, however, often been clearly demonstrated—by Hartog and Rhodes (1936) for instance. Nevertheless the interview is probably the only safe way of choosing those candidates whose personal qualities recommend them for a medical career. The question then arises: how can the interview be improved, or supplemented, so that we can select more successfully?

One of the difficulties is that we are attempting to predict, from the candidate's behaviour at the interview, what his behaviour will be as a student and doctor—and he may behave very differently in different situations. This difficulty stimulated the development of some of the procedures used by the War Office Selection Board and the Civil Service Selection Board; here candidates are observed in situations more like those in which they will do the work for which they are being selected. There are obvious difficulties in using such methods for medical students, because we could not hope to test them for the skills that a doctor needs, but only for the capacity to develop these skills during their training. One way of meeting the difficulty is to extend the process of selection into the early part of the training period, as advocated by Brinton (1951). Another way is to watch the candidate in a number of different situations, so that his assessors get a better idea of the range of his behaviour; and various forms of group interview could be used for this purpose.

COMPARISON OF INDIVIDUAL AND GROUP INTERVIEWS

In the individual interview the candidate is seen reacting to one person, or to a board, and in general he is expected, and he expects, to behave as a junior to a senior. It is proper that his behaviour in this rôle should be tested, for a good deal of a student's time, and part of a doctor's, will be spent in this way. Most people, however, do not behave towards juniors or contemporaries in the same way as they do towards seniors—some people behave very differently indeed—so the value of such an interview, in indicating how the candidate will behave to patients or to colleagues, is limited.

In a group interview the candidate is seen in a much more complex social situation, for he is reacting to several other candidates, who are contemporaries, as well as to his assessors, who are seniors. Thus, the group interview samples the candidate's behaviour in a different social setting. It differs from the individual interview in another very important respect. The etiquette of the individual interview is fairly well established: the candidate usually speaks only in answer to a question, or when invited to make a statement; the assessor takes the initiative and the candidate responds. In group interviews, however, the candidate must form his own judgment of the situation and how to conduct himself. The assessor plays a much less active rôle, and the candidate a much more varied and autonomous one.

DEVELOPMENT OF THE GROUP INTERVIEW

Testing by various group methods was developed during the last war (O.S.S. Assessment Staff 1948, Harris 1949). Group interviews are now an established part of the Civil Service Selection Board procedure (Vernon 1950). They are also being used in several other ways—e.g., in the selection of applicants for training as teachers at Dudley Training College (Jordan 1950) and at Manchester University (Herbert 1951); in making various appointments in industry (Fraser 1950); in choosing dental students at Manchester University (Warburton 1952) and medical students in the U.S.A. (Wood et al. 1949).

GROUP INTERVIEW AT UNIVERSITY COLLEGE

The group interview can be used in different ways; the main aim may be to test leadership, or simply to see how well candidates get on together. For each purpose modifications of technique are of course necessary. In our interviews we were mainly concerned with testing social adjustment, and the ability to think effectively about an abstract scientific topic.

The candidates were interviewed in groups of eight, sitting round a table with two assessors. The selection procedure (Aitken and Johnson 1952) was explained, and we told them that we were trying this rather complicated method of three interviews because candidates often felt that in the usual interview lasting ten minutes or so they did not have time to do justice to themselves. By this method they would be interviewed in all for about one and a quarter hours. We tried to reassure them as much as possible by saying that we appreciated that most people found any interview an ordeal, and if they were not used to discussions they might find this kind particularly difficult. Their final assessment, however, would not depend on any one test alone. They were then asked to discuss as freely as possible the topic printed on a slip of paper given to each candidate.

The Topic

We have experimented with the kind of subject the candidates are asked to discuss. To give everybody a fair chance, we avoided subjects about which the knowledge and experience of candates might vary; and controversial subjects were excluded because we did not want to test ability to debate or argue. "The qualities necessary in a doctor" was used for some time, but we found this subject too general to be discriminating. Such topics as "The results of an experiment cannot be wrong" and "In science the primary duty of ideas is to be useful and interesting even more than to be true" were stimulating though difficult. They seemed to have the following advantages:

(1) It is probable that they are equally unfamiliar to most candidates so none would have an unfair advantage.

(2) They invoke the kinds of thinking we wanted to test, and allow discrimination between candidates.

(3) We were developing a method of teaching certain scientific skills by group discussion (Johnson 1950, 1952), and we could call on our experience of the ways students talk about such problems to help to assess the candidates.

The Behaviour of the Assessors

This is of great importance in any interview, and it was our aim to make the candidates feel as much at ease as possible, so that they could concentrate on the problem. They would almost certainly feel themselves as competitors, so we maintained a neutral position, showing no approval or disapproval, agreement or disagreement, but at the same time trying not to appear aloof or unsympathetic. We found it best to say very little in the early stages of the discussion in order to give candi-

dates the opportunity of taking the initiative. Later we would take a more active part, if necessary trying to draw out any specially silent people, or confirming the impressions we had already formed. Finally, with the aim of relieving any feeling of frustration which the participants might have at grappling with such a difficult subject, we would attempt to clarify confusions, point out discrepancies between statements, or reconcile different views, and show how the discussion had been concerned with problems of very fundamental scientific importance. With rare exceptions the assessors found the discussions extraordinarily interesting.

There is obviously a need to experiment with the part that the assessors play in group interviews. The experience of those who have studied some of the complex interactions between participants in interviews can be extremely useful in helping one to understand some of the difficulties involved (Oldfield 1941, Rogers 1951).

Assessing the Candidates

First, the two assessors separately graded the candidates on the five-point scale (Aitken and Johnson 1952). They then discussed them, and agreed on the grade which was to be presented at the final meeting of selectors. The assessment is based on the observation of a complicated piece of social and intellectual behaviour, certain aspects of which can be considered separately.

Adjustment to a difficult situation.—The topics are difficult, and the whole situation in which the candidate finds himself is very trying, but a doctor's life is, after all, not one of uninterrupted ease, and it seems legitimate to assess candidates on their ability to cope with some kinds of stress.

A few candidates, in spite of encouragement, say so little during the 50-minute interview that any assessment of them is bound to be unreliable. Nevertheless, it is probably fair to assume that such a candidate has less claim to a place than one who can cope satisfactorily with the same situation; and in fact none of the four candidates who made no contribution to the discussion did well in the individual interviews.

But candidates who say little do not necessarily get a low assessment. Some have an extraordinary capacity for taking in what is going on, and after saying nothing for a long time will suddenly take charge of the discussion, clarifying and summarising what has been said. Others seem to ruminate apart, and then produce a new idea which leads the discussion into different channels. It is scarcely necessary to add that those who say a lot do not always get a high assessment.

Personal relations.—Some candidates seem to establish good relations with others easily, while some are aggressive or overcompliant; some are consistently helpful and sympathetic, others carping and destructive; some seem to be generally liked, even if they are obviously more competent than the rest, and others seem to put everybody's back up. A very few seem to be uncoöperative, or at least not very tactful—e.g., those who appear bored and listless, or those who persistently talk too much so that others do not get a chance. Social factors have to be taken into account in assessing the ease of personal relationships, and the information supplied on the application form and referee's report are helpful here. We are attempting to assess what Dr. C. F. Harris (1951) described as the "capacity to fit in with and to surmount obstacles in his environment . . . the capacity of a public school boy to live down the worst pitfalls of a public school education, or of a miner's son to remain on equal terms with those coming from an entirely different home background."

Understanding other people.—Some candidates listen attentively to what others say and seem to understand easily; others ignore, override, or misunderstand them.

Ability to understand the topic.—Some people often refer to the typed slip, and try to make sure they are discussing the subject given; others read the statement inaccurately and may fail to discuss it properly.

For instance, it is common for at least one person in each group to talk as though the topic "In science the primary duty of ideas is to be useful and interesting even more than to be true" was in fact "The primary duty of science is to be useful"—i.e., to provide equipment and material of practical use in everyday life. Again, the statement "Observation is a process of selection or discrimination—a process of selecting and discarding from the sum total of presenting objects" is sometimes misinterpreted, and discussed as if it read "Selection is a process of observation . . ." and as if it was concerned with the selection of medical students.

Mistakes such as this (and indeed all the statements made) must of course be evaluated in their context. If the first person who speaks makes such a mistake he may be excused on the ground that perhaps he feels impelled to say something and does not allow himself time to consider; but a candidate who makes the same mistake late in the discussion or who persists in making it even when it has been pointed out to him is less easily excused.

The quality of the contributions to the discussion.—The points looked for here include clarity of expression; recognition of sources of confusion—e.g., that caused by using the same word in different senses; comparing and contrasting various viewpoints; bringing up new points; and reviewing the discussion at intervals. The discussion lasts long enough for us to see that some candidates are able to reconsider, and if necessary to modify, their own opinions, while others seem to be less receptive to ideas which are new to them, and tend to repeat without modification things they have said before.

CONCLUSIONS

The ideal candidate is one who adjusts himself satisfactorily to the situation; gets on reasonably well with everyone else; listens to what others say; expresses himself clearly; talks sensibly; has a good grasp of the implications of the topic and of the matter of the discussion; and is able to re-evaluate his opinions in the light of what is said. This may seem a tall order, but of the 204 candidates interviewed this year, 19 were assessed as A (very good) and 64 as B (good). Candidates considered good are of many different kinds, showing various combinations of the desirable qualities. Indeed, the group interview seems to bring out the infinite diversity of candidates.

The kind of qualities which can be assessed by this method, the nature of the topic used, and the manner in which the discussion is conducted all need further experimental investigation. The remark of Oldfield (1941) about the individual interview is also true of the group interview: "At this stage of our knowledge the prime object of discussion must be to stimulate thought. Those whose business it is to conduct interviews could render invaluable service to their art if they would reflect upon the methods they use, give expression to their views, and try to perceive clearly the psychological implications and conditions of what comes to their notice."

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FILARIASIS IN THE PACIFIC

FROM A CORRESPONDENT

FILARIASIS is widespread in Polynesia and is indeed the main bar to progress in these beautiful and fertile islands. The International South Pacific Commission set up in 1949,[1] which now has its headquarters in Naumea, New Caledonia, is concerned, among other things, with suppression of the disease. The parasite responsible is a non-periodic microfilaria, whose adult form is now known as *Wuchereria pacifica*, and it is transmitted by the day-biting mosquito, *Aëdes pseudoscutellaris* (probably in reality *A. polynesiensis* Marks).

Since 1948, American workers have been active in the study of Polynesian filariasis, especially in Samoa and Tahiti, and some results of their researches have now been published. A group of entomologists, parasitologists, and pathologists from the University of California has been working in close association with members of the French Medical Research Institute at Papeete, the capital of Tahiti.[2] In this historic island the proportion of inhabitants harbouring microfilariæ in their blood and showing clinical signs of the disease is higher than it is in any other Pacific island yet investigated. Among the large number of people examined, no male over the age of 50 was free from signs of filariasis. (In all parts of Tahiti the proportion of males harbouring microfilariæ was higher than the proportion of females, which points to some discrepancy in exposure to, and acquisition of, the primary infection.)

Following the example of Fiji, an all-out effort is being made with the eventual aim of eradicating the main mosquito vector, *A. pseudoscutellaris* (*polynesiensis*), from the island of Tahiti and its satellite Maiao (approximately 60 miles west).[2]

To assess the prevalence of filariasis, studies were undertaken in nine areas, of which eight were on the main island and one on Maiao. The indices chosen to determine the ultimate effect of control measures were based on the average number of microfilariæ per 20 c.mm. of blood per person, the proportion of persons whose blood contained microfilariæ, the number of attacks of lymphangitis or filarial fever per person in the area, and the density of *A. pseudoscutellaris* (*polynesiensis*) in the larval and adult stages as well as the rate of filarial infection in wild-caught mosquitoes. A census of the adult mosquito population was made by means of observations at three "resting" and three "biting" stations in each of the nine areas; at the former collections were made between 8 and 9 A.M., and at the latter between 1 and 2 P.M. Here the captured mosquitoes were dissected to ascertain whether they were infected. A comparison between the mosquito populations and the average number of infected larvæ found in them, before and during the experiment, provided valuable information about differences in transmission-rates.

In the nine areas the average total percentage of the population with microfilariæ in the blood before the inauguration of control measures was 32·2. (In one area in Tahiti it was 58·3, while in Maiao it was 21·1.) One area (with a percentage of 38·6) was retained as a control, while in the other eight the measures varied. In some of them sanitation alone was employed; in others sanitation plus destruction of mosquitoes with D.D.T. In some the population were given 'Hetrazan' (2 mg. per kg. body-weight three times daily for seven days); and in others both hetrazan and insecticide were used. Sanitary measures were directed to mosquito breeding-places, with the object of draining or destroying them. Anti-mosquito measures consisted mainly in spraying the interior as well as the exterior of houses with 5% D.D.T. emulsion in water every three months while all vegetation within thirty yards was treated with 1% of this insecticide.

Of the nine species of mosquito, *A. pseudoscutellaris* (*polynesiensis*) and *Culex fatigans* were the most abundant. The former was found breeding in a great variety of places, the most important being coconuts, especially when rat-eaten. It seems that neither sanitation alone, nor D.D.T. alone, reduces the numbers of this aëdes as effectively as it reduces the numbers of other species. It was found, however, that where the population of an area had been treated with hetrazan the proportion of mosquitoes with infective filaria larvæ was reduced—in one area from 10 to 0·6% in a year.

The percentage of people with microfilariæ was estimated before, at six, and again at twelve months after treatment had been instituted. In each of the four areas in which hetrazan was administered, the percentage of positives fell appreciably; but a comparison of those positive before and after treatment does not show the effect of the drug so clearly as does a comparison of the actual numbers of microfilariæ per 20 c.mm. of blood, which on the average were less than 10% of the original number. It is particularly difficult to assess the influence of the drug on the frequency of attacks of lymphangitis, but in general it may be stated that the effect on other filarial manifestations was disappointing. The investigators feel that their data do not yet permit of statistically significant conclusions regarding the absolute superiority of any single method. In the attempt to formulate a programme for the control of filariasis which must extend over a long period, many points had to be taken into consideration. Necessarily it will require years of further study in order to determine how far the clinical manifestations of filariasis are reduced by the measures adopted.

A good deal of evidence on the transmission of filariasis outside the villages has been collected by Jachowski and Otto[3] in American Samoa. There a survey of ten villages was undertaken, and four collecting-stations were established for each village at varying distances from the open green or *malae* and at various distances in the bush leading to the banana or coconut plantations. Collections made within a period of 1½ hours on a single afternoon yielded over 2000 mosquitoes which were then dissected for larvæ of *W. bancrofti*. In the bush itself the frequency of infected mosquitoes seemed to be related to the amount of native traffic, none being found in the areas devoid of human beings. The index of transmission was obtained by multiplying the density by the proportion of mosquitoes infected. From this it appears that mosquitoes in the houses and in the open *malaes* are of little importance compared to those in nearby bush or in houses close to it. The index is very high 175–275 yards from the centre of the villages. It thus appears that, in Samoa at least, one hour spent in the bush offers greater opportunities for infection than twenty-three hours spent in the village.

The age and sex distribution of microfilaræmia in Samoans added to the habits of the people, or to the biting habits of *A. pseudoscutellaris* (*polynesiensis*), support the conception of non-domestic transmission which is common also to *W. malayi*. Consequently in American Samoa residual spraying of native houses cannot be expected to be useful. The attack on the mosquito must be made in the bush. The same appears to be true for Tahiti and other islands of the Pacific where the non-periodic microfilaria is found.

1. See *Lancet*, 1951, ii, 1082.
2. Beye, H. K., Edgar, S. A., Mille, R., Kessel, J. F., Bambridge, B. *Amer. J. trop. Med. Hyg.* 1952, 1, 637.
3. Jachowski, L. A., Otto, G. F. *Ibid.* p. 662.

Reconstruction

PAYMENT FOR MEDICINES IN AUSTRALIA

M. JOYCE DAMPNEY
B.A. Oxfd, M.A. Melb.
FORMERLY DOMINIONS SCHOLAR OF THE GOLDSMITHS' COMPANY, LONDON

IT has become a political necessity to safeguard national finance from excessive expenditure on drugs. Three methods are open to a government. It can make a charge on all medicines (probably a small sum payable on every prescription); it can standardise prescriptions by means of a formulary; or it can say that only certain selected drugs will be supplied without charge. The first method has lately been introduced in Great Britain by the shilling charge on prescriptions. The second method was proposed in Australia in 1944, but the restriction of the doctor's freedom to prescribe evoked an opposition strong enough to prevent adoption of the scheme. The third method was introduced in Australia in 1950 and has operated smoothly.

THE AUSTRALIAN EXPERIMENT

In 1950, under the Pharmaceutical Benefits Act, a limited service of pharmaceutical benefits was introduced in Australia which incorporated proposals put forward by the British Medical Association in Australia. They believed that the financial burden of medicines to the individual could be eased if the government paid for costly drugs. They therefore suggested that a limited number of "life-saving and disease-preventing" drugs should be provided without charge to the patient. By Commonwealth government regulation a list of these free drugs was issued, in which there were no compounds. At first the list contained 139 items, and by March, 1951, there were 185 items. The cost of the Pharmaceutical Benefits Scheme in 1951–52, the first full year of the scheme, was £7,327,400. Of this amount £6,700,000 was paid to chemists for 6,500,000 prescriptions. In the present year (beginning July 1) the expenditure for one month came to £496,900 for 523,000 prescriptions, an average price of 19*s*. per prescription. The total cost includes payments to hospitals, bush nursing-centres, flying-doctor service, and those practitioners who do their own dispensing.

In 1951 the Pensioners' Medical Service was introduced which allows for all persons in receipt of an old age, invalid, or widow's pension, a Service pension under the Repatriation Act, or an allowance under the Tuberculosis Act, or their dependants, to receive compounded medicines as a charge on the Commonwealth government. The drugs offered under this service are those drugs appearing in the *British Pharmacopœia*, and proprietary preparations are not included.

The payments to chemists for pensioners amounted to £357,600 during 1951–52 and covered some 1,600,000 prescriptions. (This is only eleven months' expenditure because prescriptions dispensed in one month are paid by the Commonwealth government in the following month, and the scheme began on July 2, 1951.)

Prescriptions in Australia may therefore be issued under two Acts or supplied privately; and the three methods of issue are kept separate. The organisation has worked smoothly in practice and with general coöperation. At the same time, costs have tended to exceed estimates, largely because new and expensive drugs have been introduced. About a third of the prescriptions dispensed by chemists each year are paid by the Commonwealth government under the two public schemes.

Soon after the schemes began it was evident that excessive quantities of certain drugs were being prescribed, particularly the antibiotics. Also the government was faced with the need to save dollars—some drugs were supplied from dollar areas only—and to start a stockpile of drugs which might become scarce. Accordingly a measure of control was introduced on the doctor's freedom to prescribe.

At first in 1950 the doctor who wished to prescribe streptomycin or chloramphenicol for one of his patients had to write: "I certify that in my opinion there is no other drug available which would be equally effective in this case." Nearly three months later it was decided that the doctor could only write such a prescription after he had received a numbered authority from the director-general of health or his delegate. In each State the Commonwealth department of health operates a 24-hour service to respond to calls from doctors on the telephone and by telegraph. The minister of health is empowered to declare by regulation that a certain drug may only be prescribed in the treatment of a disease specified by him.

DISCUSSION

Unnecessary prescribing is a subtle form of abuse, seldom entirely conscious, and under a scheme such as the Australian one a doctor may overlook the fact that the free list is costly to the National Exchequer and prescribe in a way likely to save his patients' pockets. Thus there are times—and cases of mild infection may perhaps serve as an example—when the practitioner may select the more expensive free drugs in preference to simpler and cheaper drugs for which his patients must pay. On a large scale—and Great Britain has a population five times as great as that in Australia—such habits might well make the limitation of pharmaceutical benefits to a restricted list more expensive than a small flat-rate charge on all drugs. On the other hand, the introduction of a small payment on every prescription in Britain makes it difficult to avoid individual hardship, and informed opinion in Britain has shown interest in the Australian scheme. Lord Moran,[1] who opposed the flat-rate charge on every prescription, suggested that a distinction should be made between essential and non-essential drugs, and only the essential drugs issued free of charge. Yet to make such a distinction might prove difficult in practice, since drugs are prescribed for people, and it is people, rather than drugs, that have an essential need or a less essential need. To take an example: a man in employment who has pneumonia and is absent from his work for a month or so, remaining on full or half salary and in receipt of sick benefit, would probably receive free treatment with an antibiotic (considered essential). On the other hand a man with a chronic disease, such as disseminated sclerosis, who is unable to work, might be asked to pay for sleeping drugs, digestive mixtures, and other palliatives (considered non-essential) which he needs from time to time.

By legislation the State may proclaim one group of drugs as free and another group as not free, or may impose a flat-rate charge on prescriptions; but at best either scheme is clumsy and unfair in practice, and irksome to doctor and patient alike. One can only conclude that in the long run the best way of limiting the cost of prescription is through the medical profession. Only the doctor can educate the inconsiderate and ignorant patient, and only the doctor can decide when a drug is necessary and when a patient should be asked to make a small purchase at the chemist's shop instead of claiming a prescription.

1. *Hansard*, House of Lords, March 26, 1952, par. 990.

In England Now

A Running Commentary by Peripatetic Correspondents

Sir Heneage Ogilvie last week must have pricked the consciences of many of us consultants. I know ever since I became a consultant physician in the eyes of the National Health Service, the terminology has worried me. This is the sort of thing that happens when perhaps one is invited out to dine.

Guest: "Oh, I hear you are a doctor. How wonderful! Are you in general practice?"

Self: "No, I work in a hospital."

Guest: "You are a specialist, then?"

Self (guiltily): "Well, I suppose I am officially."

Guest: "What do you specialise in? Are you a heart specialist or a nerve specialist, or what?"

Self (embarrassed): "I don't really specialise in anything. I do general medicine."

Guest (suspiciously): "I see."

Second Guest (whose wife's second cousin is a doctor): "I know, you're a house-physician."

Self: "No. I was one many years ago, but not now."

Hostess (coming to the rescue): "You're a consultant, aren't you?"

Self (miserably—with memories of the grand old men who taught us in our medical schools long ago): "According to the regulations, I'm of consultant status but whether I'm a real consultant, I don't know."

Silence, while all the guests take this in and become convinced you are lying and have been struck off the register for an illegal abortion or for signing a wrong certificate.

I wish Sir Heneage could devise a term for us which is not too insulting. Meanwhile, perhaps Mr. Stephen Potter could tell us how to cope with the situation, and direct the attention of the famous school at Yeovil to our predicament. How does Odoreida get out of it?

* * *

I got my fellowship and my allotment on the same day; I had waited a long time for both, but there was no doubt which gave me the greater pleasure. The allotment has waxed fat; never such tasty asparagus, such succulent strawberries and tomatoes to strain at the leash of their staking. All this, of course, is a matter of pride, but for the heaviest crop of all I can claim no merit. Our *Coprinus comatus* have had a long season and seem still to be coming on. Spinach marches proudly in ordered rank and even the marrows are marshalled, but you never know where coprinus will be tomorrow; perhaps between the bean rows, or round the rhubarb, or inside and outside the cold frame. Its range extends from one plot to the west of mine to two to the east—from all of which I harvest them to the doubting wonder of the owners. Before I bought the twin slim volumes, *Edible Fungi* and *Poisonous Fungi*, I knew coprinus only as the Inky Cap, nor thought of using it for anything but the blacking of leather shoes. Even after careful identification from legend and coloured plate I cooked and ate the first takings with terror in my heart, and for three days I ate them alone. The family hastened to inspect me each morning, but my health remained excellent. Then we had a Danish guest who ate them gladly, and they were won over; so now we all eat them every day. The taste of coprinus is like that of the field mushroom but perhaps a little stronger; they fry well, are delicious steamed and served with butter, and make an excellent sauce. Perhaps next year my allotment will yield *Morchella esculenta* or even *Cantharellus cibarius*. But by then the other allotment-holders may have been given the books for Christmas and be anxious to gather their own free-given crops! Till then we shall gorge ourselves and hope that the bomb-debris that underlies our tilth will burgeon as richly every year.

* * *

Our recent attempt at the best of three falls with one of the august bodies that reside behind Southampton Row has given us a respect for the London taxidriver's powers of observation and diagnosis. Inwardly trembling, but outwardly "with merry oath and laughter and a smile upon our lips," we stepped into a taxi and asked for Queen Square. Instantly penetrating the façade, he asked "Examination 'All?"

* * *

The boy who debunked Harvey in "News from School" on Oct. 18 is a lad after my own heart. I believe that if a group of 12-year-old modern schoolboys were presented with the anatomical facts as Vesalius knew them, at least half the boys would discover the circulation of the blood in five minutes. Why then, you may ask, did not Vesalius anticipate Harvey? When you look at Vesalius's illustrations of the heart you wonder how he could have accepted Galen's teaching that the blood passed from one ventricle to the other through pores in the septum. But, after admitting he could not find the pores, he let the matter drop. There are those who say he really did discover the true function of the valves but he was afraid that publication of his opinion might invoke religious persecution. This is pretty thin. I think the true answer is to be found in "climate of opinion." Brilliant anatomist though he was, Vesalius never escaped from the galenical climate. Harvey escaped—probably by chance, but possibly because he was a stranger. You can visualise him, awkward, mulish, and cranky, among the elegant Italians. He never really belonged, so he did not have so far to go.

That explains Harvey, because, the more you think of it, there was nothing really *in* the circulation—nothing that Macaulay's schoolgirl couldn't figure out in a few hours. And now in return for my explanation, can you tell me which philosopher, psychologist, or scientist, writing about 1911, invented the phrase "climate of opinion"?

* * *

The general practitioner's life is not made easier by the unceasing postal bombardment with bits of blotting-paper—varied with high-grade glossy—designed to impress on him the virtues of proprietary remedies. There is, of course, no positive harm in this breakfast-table series, and no doubt when they are taken to school by the doctor's children the status of the family is enhanced. But it is a sobering thought that these snappy pharmacological messages often occupy most of the time which a busy practitioner can spare for professional reading. Is it fair to those who taught him his job in the medical school and hospital that he should be thus deserted? We live in an age that has seen the revival of the "News Letter." Topical, concise, and informative, it often fulfils a real need for the busy man who is putting all he's got into his job. Isn't it time we had a news letter in therapeutics—perhaps on the lines of the *Army Medical Department Bulletin* that so many isolated M.O.s found useful in the late war?

And then, what fun it would be spotting the authors of these miniature annotations: nothing longer than 100 words—what a training for aspiring after-dinner speakers. Here the limpid prose of a Robert Platt, there the authoritative dicta of a Henry Cohen, and that tell-tale phrase pathognomonic of an Englishman exiled in Scotland. Are we on the threshold of a new medical literature?

* * *

International kudology needs a clear head and a quick tongue. Before going to the States I was warned that no-one would be introduced to me as plain Professor unless for some unfortunate reason he had no doctorate of any kind. And so it turned out: it was an embarrassing moment meeting him. But there came another day when I had to confess that I also wasn't a doctor. Hoping to give the right impression, I went on to explain that in England a bachelor's degree was all that was required for qualification, and that there were a few very eminent men who were satisfied with the simple letters M.B., F.R.S. "Oh!" came the reply "we never put membership of societies after our names."

* * *

A NEW DIALOGUE

Medico: Good morning, Socrates.

Socrates: Good morning, Medico. Did I see you emerging from the hospital just now?

M.: You did, Socrates.

S.: And what have you been doing there?

M.: Removing the tonsils of a dozen children.

S.: For the reason, I suppose, that they will be better without their tonsils than with them?

M.: Assuredly.

S.: Is every man therefore necessarily better without his tonsils than with them?

M.: How not?

S.: But I am asking you, Medico, whether you think that every man should be deprived of his tonsils at birth or at some other time.

M.: No, Socrates, not every man, for then there would be no end to the removing of tonsils.

S.: I understand then that you have to select some tonsils rather than others for removal?

M.: Certainly.

S.: Presumably those children with bad tonsils will be selected for operation rather than those with less bad ones.

M.: How right you are, Socrates!

S.: It follows therefore that it is better to have bad tonsils than good ones.

M.: By what process of reasoning, Socrates, have you reached that conclusion?

S.: For, O wonderful one, it is clear that those people with bad tonsils will be deprived of them, while those with less bad ones will be left with theirs.

M.: I suppose so.

S.: And what do you do with the children after the operation?

M.: They are put into several beds in one ward where they are cared for by the nurse until the wounds are healed.

S.: There are then, or might be, O Medico, twelve children in one ward?

M.: You say true things, Socrates.

S.: And have you read the instructions of the Governing Body about the number of cubic feet to be allowed to each patient?

M.: I am afraid that I have not.

S.: You surprise me, Medico. Surely it is your duty to read the regulations of the people set to govern you?

M.: I am a surgeon, Socrates. I am not an administrator.

S.: Indeed, Medico? But you would agree that the regulations are drawn up so that good should be done to patients rather than harm?

M.: I couldn't agree more, Socrates.

S.: Then if a sufficient number of cubic feet is not allowed to each child, more harm may eventuate than good?

M.: Perhaps.

S.: But surely, my good man, you must see this. Take horses for example: are not the best trained horses the ones allotted the most stable room?

M.: Yes.

S.: And the same would apply to bees, I suppose? Surely the bees with the optimum hivage area are the best cared for?

M.: I get you, Socrates.

S.: And does not the same principle apply to youths training at the Palæstra, criminals in prisons, badgers, and swallows and nightingales in their nests?

M.: I expect so.

S.: But listen, my good friend. I am speaking of facts and not of expectations. Surely you would not wish the human race to be less well treated than animals?

M.: Of course not.

S.: To return to horses, therefore—

M.: Look here, Socrates, I am a surgeon. You should tell other doctors these facts: see, they are all coming from the staff room yonder. But while I am with you, O best of men, tell me how I may best be enabled to perform my tonsil operations with a view to doing the most good possible to my patients.

S.: I would gladly do so, Medico, but unfortunately I have to come up before the Thirty in a few minutes: they are proposing to accuse me of corrupting the Youth's health by evading the regulations of the Governing Body and overcrowding the hospitals. . . .

Letters to the Editor

SPECIALISTS AND THEIR QUALIFICATIONS

SIR,—Sir Harold Himsworth from a position of authority stresses the dangers to research of too rigid and fixed boundaries between organised subdivisions of knowledge. On a question of terminology, may I however suggest that the term "stratification" is merely the same thing. I raise the question, not just as a verbal quibble, but because there is something of a different character which may legitimately be called stratification, and which is also a danger to research by interfering with the free interchange of ideas: I refer to stratification according to the position of individuals in the hierarchy of their group, a phenomenon particularly liable to occur in clinical medicine. It is my strong impression that both dangers are less marked in American than in British medicine, and that our American colleagues are both more bold than we are in following a clue outside their own specialised departments of knowledge, and better at mixing on terms of intellectual equality irrespective of hierarchical status within the group. Finally, is it really too late to reverse the present trend towards an excess of "precisely prescribed requirements for the training of consultants and specialists," and to recognise that too rigid definition of temporary boundaries of convenience, and consequently of qualifications for entering within those boundaries, may in the long run be harmful to progress?

London, W.1. DAVID PATEY.

FUTURE OF THE OCCUPATIONAL HEALTH SERVICES

SIR,—Those who criticise the report of the Dale Committee do so for two reasons: first, they have not understood its terms of reference; and, secondly, the critics assume that planning as such is a good thing.

The first misapprehension is easily corrected by those who take trouble to obtain the report and read it, when they will find the committee's terms of reference were very largely confined to conservation of man-power. May I recall that the committee proclaimed the importance of industrial health services. This is more than many of its critics have done. In the difficult political circumstances at the time of the committee's appointment and during its deliberations, this cannot, in fairness, be called timid. Even to have disposed of the implications implicit in the Prime Minister's ban on developments in industrial health services pending the committee's report, is a valuable achievement.

The onus of proof that planning is good should lie on those who wish to plan. The standard of British practice in industrial health is the highest in the world. That is no reason for not trying to make it better, but it is a reason for caution. Without exception all legislation planned in vacuo has been a failure. To hamper industry (meaning all forms of work) with unsatisfactory legislation is too serious. The usual argument used by planners is "what about the small factories?" I have not heard a logical development of the argument beyond this point. Supposing the state of small factories is bad (which I do not accept), can it be improved by direct action of doctors? That is the crux of the matter. Maybe stronger enforcement of stricter minimum standards is needed; but that is a matter of legislation and inspection, not of medical services.

Planners must meet the following difficulties:

1. In the British tradition employers are responsible for the health, safety, and welfare of their workers. Sanctions and duties are placed by law on employers and workers; this being so, they must be free to seek advice from doctors whom they trust and of their own choice. This advice will be the

more readily accepted if it is an integral part of management. To provide this advice is the primary function of industrial health services. In spite of much political exhortation, the interests of employer and employee are the same in this matter.

2. Enforcement (not vague supervision) of minimum standards must be uniform throughout the country if differences between different parts, as between Lancashire and Japan, are not to arise. Unless the relationship between the central government and local authorities is to be profoundly altered, enforcement by the servants of local authorities (e.g., medical officers of health) is not acceptable.

3. Medical examinations (except for strictly limited objectives, such as a few toxic hazards) have, in modern circumstances, little bearing on health. Uncritical recommendations for widespread medical examinations as panaceas for all ills are too common. Since the school health service now sends young persons from school either in excellent health or with their defects known and categorised, even the appointed factory doctor's examination of young persons is of very doubtful utility. What other function is there for doctors, not part of the managerial team, to perform unless it be inspection to see that minimum standards are observed ?

4. Very few doctors have the requisite knowledge and skill to give advice of the nature required by employers and workers. Vague generalisations will quickly bring medical advice into disrepute. How are the planners going to educate medical officers of health and others who wish to bring occupational medical services within their grasp ?

Let me be frank. The Dale Committee's report undoubtedly disappointed many. To say that evolution is better than planning is unpopular. Evolution does not lend itself to quick paper empires. Too many persons think that industrial (or occupational) health is primarily a medical matter. To build up a large superstructure of doctors around industry would only place a useless and needless burden of bureaucracy and mediocrity on men and women at work. In the end, even the National Health Service depends on the efforts of these men and women. Accurate information, as opposed to theories and dogmatic summaries, is what is wanted. When this has been obtained, then and then only may action be taken with safety. I will forecast that action based on knowledge will be toward a small, highly skilled cadre of doctors rather than toward unwieldy and untrained regiments. My criticism of Government departments is not that they have not agreed—for they have nothing to agree on—but that one or all of them have not initiated surveys. Perhaps the coördinating committee recommended in the Dale report, if and when appointed, would do this.

Lest anyone should reply that this letter is special pleading, let me declare my interest. I was a member of the Dale Committee.

Southwell, Notts. T. A. LLOYD DAVIES.

SIR,—Your championship of occupational health is indeed welcome to all of us engaged in this field. Your contributors and your leading article (Oct. 11), however, seem to the less vocal of us to miss one essential point. The subject is treated as if it were a "service" which can be imposed from above by legislation, and quite logically the argument goes on to suggest that the answer lies with the Ministries.

The answer really lies with doctors themselves. The whole medical profession almost automatically knows its way about the stresses and strains of family life, of the life of the diabetic and the tuberculous. There are very few doctors, however, who understand the stresses and strains of modern industrial life ; and until more doctors are trained in elementary industrial administration, legislation and a "service" will simply operate in vitro. Nothing I have yet read satisfies me on the in-vivo end of the stick.

Radlett, Hertfordshire. P. PRINGLE.

RECURRENT POLIOMYELITIS

SIR,—During last year's epidemic of poliomyelitis in Milwaukee, which was the most severe in the city's history, there was an instance of recurrent poliomyelitis. 49 examples of second attacks of poliomyelitis have been published, but 17 of these are considered doubtful because the details are incomplete, because a long time elapsed between the acute disease and its diagnosis, or because some other disease or trauma complicated matters.

First Attack

A white male child, aged 8 months, was admitted to South View Isolation Hospital, Milwaukee, on Sept. 15, 1950, with a story of fever for 5 days and difficulty in moving his right leg. There was moderate neck rigidity and spasm of the back muscles. The right leg was flaccid, and the right foot was moving spontaneously. The patellar reflex was absent on the right, but the ankle-jerks were present. No symptoms of bulbar involvement were apparent.

Lumbar puncture yielded a clear, colourless fluid under normal pressure ; it contained 90 cells per c.mm., 84% of which were lymphocytes.

A diagnosis of acute anterior poliomyelitis was made. The boy recovered satisfactorily and regained almost normal movement in the right leg.

Second Attack

On Aug. 16, 1951, at the age of 19 months, he was again admitted to this hospital. The previous day the child vomited and became irritable and feverish.

There was bilateral ptosis, most marked on the left, an inconstant right internal squint, definite neck rigidity, tenderness and spasm of the hamstrings, and tightness of the back muscles. Generalised tremor was present ; and the right leg tended to rotate medially. The previous attack had caused a slight decrease in the length and diameter of the right leg.

Clear, colourless cerebrospinal fluid was withdrawn under normal pressure ; there were 62 cells per c.mm., 83% of which were lymphocytes ; sugar 62 mg., chlorides 691 mg., and protein 10 mg. per 100 ml., with no rise in the globulin.

By the second day in hospital the fever had subsided, and the child began to eat well and was much less irritable. He was discharged after 10 days, but the bilateral ptosis persisted.

Fischer and Stillerman [1] estimate a rate of recurrence of 2 per 1000 cases, Nelson and Green [2] 0·66 per 1000, and Bridge et al.[3] 2·7 per 1000. They feel their rate casts doubt on the existence of any significant clinical immunity following a single attack of the disease. At South View Isolation Hospital 2343 cases of acute poliomyelitis were treated between 1921 and 1951 ; so with 2 recurrent cases our recurrence-rate is 1·7 per 1000. In both of our cases bulbar poliomyelitis developed in the second attack, and both times the second attack occurred within a year of the first.[4]

Hoyne and Lipton [5] quote Trask et al.,[6] McAlpine,[7] and Steigman and Sabin [8] in support of their view that immunity in poliomyelitis is specific only for the strain of virus in the original attack. However, they also think that the immunity conferred may give protection for only a short time. Still [9] also supported the idea of "minimal duration of immunity." According to Toomey [10] it is easier to reinfect monkeys with a different rather than the same strain of virus.

If we agree that poliomyelitis can occur in a subclinical non-paralytic form, it is quite possible that the apparent rarity of recurrence is due to the difficulty of recognising mild attacks. Bridge [3] agrees that, until we are better

1. Fischer, A. E., Stillerman, M. *J. Amer. med. Ass.* 1938, **110**, 569.
2. Nelson, N. B., Green, W. T. *Amer. J. Dis. Child.* 1943, **65**, 757.
3. Bridge, E. M., Clark, G. H., Abbe, D. *Ibid*, 1946, **72**, 501.
4. Fox, M. J., Madden, W. J., Kohn, S. E. *Ibid*, 1948, **75**, 395.
5. Hoyne, A. L., Lipton, I. *J. Amer. med. Ass.* 1951, **146**, 707.
6. Trask, J. D., Paul, J. R., Beebe, A. R., German, W. J. *J. exp. Med.* 1937, **65**, 687.
7. McAlpine, D. *Lancet*, 1945, ii, 130.
8. Steigman, A. J., Sabin, A. B. *J. exp. Med.* 1949, **90**, 349.
9. Still, G. F. *Arch. Dis. Childh.* 1930, **5**, 295.
10. Toomey, J. A. *Amer. J. Dis. Child.* 1936, **52**, 802.

able to diagnose the mild forms of the disease, the possibility of a second attack might well be anticipated.

It has been estimated that the incidence of second attacks of poliomyelitis is nearly the same as that of recognised first attacks in the population at large.[1–3] The number of people developing clinical poliomyelitis for the first time forms about the same proportion of the general population as those who have a second attack do of the known poliomyelitis population.

However, it seems that in undoubted recurrences the virus does not attack the same level of the central nervous system as before. This may mean that immunity has been "fixed" at a certain level or portal of entry, and that involvement elsewhere is possible. But if different strains of virus attack different levels of the nervous system, this observation may support the view that immunity is specific for specific strains and not heterologous for all strains of poliomyelitis; or it may merely mean that "the fire will not catch on burned out wood."

I am indebted to Seymour Goldberg for assistance in this review.

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MAX J. FOX.

ADDICTION TO BARBITURATES

SIR,—I have been caused considerable embarrassment with members of the profession and others, in regard to reports which have appeared in some daily newspapers to the effect that at a meeting of the North East Metropolitan Regional Hospital Board on Oct. 22 I stated that there were hundreds of thousands of barbiturate addicts in Britain and, secondly, that barbiturate drugs could be purchased without prescription from some chemists.

I made no such statements or similar statements either at the meeting referred to or at any other time.

North East Metropolitan Regional Hospital Board, 11A, Portland Place, London, W.1.

JAMES GRAHAM
Senior Administrative Medical Officer.

OVERLOADING THE CIRCULATION

SIR,—The occasion often arises when an intravenous infusion has to be administered to a patient in need of fluid replacement. This in itself usually presents little difficulty. Yet as soon as continuity with the blood-stream is effected, there comes creeping into the medical mind the dreadful thought that the circulation may become overloaded. The fear of killing the patient is greater than the hope of curing him, and encourages prompt action to reduce the rate of flow to safe limits; and commonly the recipient then has to make do on meagre measures.

Surgeons—who only employ the stethoscope to listen to bowel sounds, or its rubber parts for cavity drainage—are especially apt to fear overinfusion. Physicians, on the other hand—providing they can overcome the mechanical difficulties of setting up a drip—are much more confident, owing no doubt to their assured ability to recognise circulatory distress.

Very many textbooks stress the danger of overloading the circulation and give the impression that this is common. Having given and seen given many hundreds of infusions, I am sure I have yet to see overloading of the circulation; and I am equally sure I have seen patients die for want of fluid, which was denied them by myself and other misguided persons.

Of the many colleagues who searched their minds to recall a case of overinfusion of a patient with normal heart and kidneys, only one could remember such a case—that of an infant who received a litre of normal saline in one hour. It is well known that when the heart and kidneys of the child or adult function normally any excess of water or salts can be disposed of at a prodigious rate. In diabetes mellitus the patient may void twenty or more pints of urine per day, and there are thirsty manual workers who could deal with as great a quantity in a shorter time.

Blood-transfusion presents a somewhat different problem, and calls for a much less liberal technique—particularly in cell restoration of the chronic anæmic patient, or in the transfusion of a patient with cardiac decompensation. Nevertheless, in the more common condition of acute blood loss the tendency still remains to administer blood too slowly and in too small a quantity. It is clinically obvious during operation that the normal patient benefits by having a greater quantity of blood transfused into the circulation than has escaped from it.

A modern revaluation of intravenous infusion and transfusion therapy based on clinical observation is surely called for.

Kingston Hospital, Surrey. W. R. MURPHY.

THE HARROW ACCIDENT

SIR,—As I have been unable to obtain a complete list of all the doctors who rendered aid to those injured in the unfortunate train accident at Harrow and Wealdstone on Oct. 8, I should be grateful for the opportunity to send my sincere thanks to all of them through the medium of your journal.

I know the names of some of them of course, whilst others preferred to remain anonymous; but, in keeping with the highest traditions of the medical profession, all of them rendered such invaluable aid that it is impossible to estimate how many more lives would have been so tragically lost had it not been for the medical attention given to them either before or immediately after they were brought from the wreckage.

I should like each and every doctor concerned to accept my very sincere and grateful thanks.

London Midland Region,
Euston Station, N.W.1.

J. W. WATKINS
Chief Regional Officer.

REACTION TO PROCAINE

SIR,—In view of the reports in your columns of severe reactions to penicillin with and without procaine,[1] the following case may be of interest.

A man, aged 47, had complained of fibrositis of the right trapezius muscle. This had not responded to simple massage with liniment, and I decided to inject 'Novutox' (a solution of procaine hydrochloride 2% and adrenaline in Ringer's solution rendered "self-sterilising" with capryl-hydrocupreinotoxin hydrochloride). I gave him a deep intramuscular injection of barely 3 ml. of novutox. Almost at once he began to feel ill. I rather disregarded this, and after about 4–5 minutes I massaged the muscle quite vigorously. About 3 minutes later he appeared about to faint. He lost consciousness, and developed a generalised tonic spasm. He became completely pulseless, and regurgitated some of the stomach contents.

About 2 minutes later he took an odd breath or two as the spasm relaxed. After a further 2 minutes or so he began to breathe again deeply, his airway having been kept clear ever since the spasm developed.

Some half-hour later he regained consciousness, but for a further 2–3 hours he felt very ill. He was taken home, after walking to the car, 4½ hours after the injection, and by next day was up and about.

I believe that this man, who had previously withstood injections of adrenaline for asthma, which used to trouble him in his younger days, is sensitive to procaine, though he had had local anæsthetics for occasional dental extractions. The effect of this sensitivity to procaine was increased by the massage I gave him after the injection, though I am as sure as one can be that I

1. Batchelor, R. C. L., Horne, G. O., Rogerson, H. L. *Lancet*, 1951, ii, 195. McConnell, R. B. *Ibid*, p. 402. Yuval, A. *Ibid*, 1952, i, 163. Smolnickoff, V. P. *Ibid*, p. 1022. Bell, R. *Ibid*, p. 1072. Wylie-Smith, R. *Ibid*, p. 1211.

did not inject into a blood-vessel. I used a no. 12 hypodermic needle. There was no local reaction at the site of the injection, even though I had first given some of the injection just beneath the dermis.

London, S.E.26. RONALD M. PENNY.

BRONCHIAL CARCINOMA

SIR,—Last week's letter from Dr. Hesling and Mr. Cruickshank draws attention to an important symptom of bronchial carcinoma insufficiently regarded. Here is the history of a patient recently in my care:

A year ago a man of 50 went to his general practitioner and said: "Doctor, I have a wheeze in my chest just *here*, which has recently appeared, and will not go away," and pointed to the upper part of his left chest. The doctor placed his stethoscope on the spot and, sure enough, heard there a rhonchus which persisted after coughing. There was no other symptom, no other sign. He promptly referred his patient to see a chest physician from a chest hospital. The rhonchus was still there. A full investigation was instituted. Chest radiographs were normal. Bronchoscopy was performed, and was negative. Finally a bronchogram was done, and reported as showing no abnormality; and the patient went home.

A year later he visited another hospital and was again examined radiographically. This time a growth of the anterior segment of the left upper lobe was manifest. It proved to be just operable; but the prognosis is poor, and in any case a year the worse. The previous bronchogram, on re-examination, showed perfect filling of the whole lung—save the anterior segment of the left upper lobe.

The lesson is simply this: a fixed rhonchus is pathognomonic of partial organic bronchial obstruction; and incomparably the commonest cause in a man of 50 is cancer.

London, W.1. GEOFFREY FLAVELL.

THE EMERGENCY OBSTETRICAL SERVICE

SIR,—Mr. Dewhurst is to be congratulated on his excellent review (Oct. 18) of the work of an obstetrical emergency service, and for emphasising several important points.

It has always amazed me to find that a doctor who tackles a difficult forceps delivery or breech extraction in domiciliary practice may hesitate to remove a placenta. Few teachings have done more harm than the one that manual removal is dangerous and only to be carried out as a last resort.

Mr. Dewhurst's condemnation of the continued misuse of pituitary extract is welcome. Surely this drug can have no place in obstetric practice, except possibly in a drip for the treatment of inertia; after delivery ergometrine has its virtues with none of its vices. Forceps delivery under chloroform anæsthesia, administration of pituitary extract, and repeated attempts to express the placenta is a shock-producing combination.

His recommendation that all patients with a history of previous postpartum hæmorrhage or retained placenta should be delivered in hospital is important. It is very disturbing to find the flying-squad being called to a patient who has been treated by it for profound postpartum shock in a previous labour. The risks in the "dangerous multigravida," and the desirability of her being delivered in hospital, are now generally realised; but it is still sometimes difficult to persuade these faithful mothers to come in.

Mr. Dewhurst rightly emphasises that a normal blood-pressure level need not be reached before the placenta is removed. The partly adherent placenta seems liable to produce shock; and if the patient's condition is improving with treatment, and open-ether anæsthesia with its supreme safety is used, the operation should not be deferred. Mr. Dewhurst mentions intravenous anæsthesia, but many anæsthetists are unwilling to use this unless an apparatus for giving oxygen is available.

There is one point, however, on which I must join issue with Mr. Dewhurst—and that is over the small amount of one or two bottles of blood which he regards as adequate for resuscitation. Although the mortality he reports is very low, considering the type of case treated, I wonder whether his results might have been better if larger amounts of blood had been given. The main difficulty here would appear to be the strain on supplies of Rh-negative blood, as unfortunately many of these patients have not been tested for their rhesus group. He does not mention plasma or plasma substitutes. It has always seemed to me unwise to run ice-cold blood rapidly into a shocked patient; and the rapid administration of dextran or 'Plasmosan' at the start of a transfusion is very valuable, and less likely to cause venospasm.

Maintaining an obstetrical emergency service in a populous area with many domiciliary deliveries throws a heavy strain on the obstetrical staff. I feel that the demands on a service and the amount of work it has to do can be greatly reduced if some of the points Mr. Dewhurst has emphasised are more generally appreciated.

Middlesbrough. BRYAN WILLIAMS.

DARK ADAPTATION FOR SCREENING

SIR,—During fluoroscopy sessions it sometimes happens that there are intervals between the screening of groups of patients when it is desirable to have some illumination, but when full dark adaptation must be preserved. I have found that two 60-watt bulbs, one coloured red and the other dark blue, burning together, give an adequate light for writing or reading, but do not disturb dark adaptation. I find that I can see the screen more clearly after having been in this light for a time than after having been in a room lit by a neon bulb, and that this method is more comfortable than wearing a dark-adaptation eyeshield with ordinary illumination; but these are subjective impressions which may not be confirmed. Others may like to try this form of lighting.

London, E.1. ALAN WATSON.

PNEUMA, PSYCHE, AND SOMA

SIR,—Dr. George Day (Oct. 11) says that "every layman is acquainted with well-authenticated stories of presumably healthy primitive men turning their faces to the wall and dying for no ascertainable organic cause, but just because a spell has been put on them." I have spent over forty years in various parts of the tropics but do not know of a single "well-authenticated" case of this kind.

Many years ago in the West Indies I investigated two cases of death which were supposed to be due to obeah spells; but there were "ascertainable organic causes" in both cases. One of the deceased was a man with pellagra: in the dementia of that disease he had turned his face to the wall and died, but the relatives were convinced that he had died of an obeah spell. I had experience of other cases in Africa.

Anyone who tries to investigate these stories of death from witchcraft or spells—they are much the same thing—will find that most of the related events took place at a distance in time or place—over the seas or beyond the hills.

I know of no part of the world where spells are recognised as causes of death either in mortality statistics or by the law; and assuredly if such a cause could be well authenticated there are many countries where recognition would be readily given, despite the difficult legal implications.

Dr. Day also appears to base much on a second proposition: "Every general practitioner is struck at some time or another by the way Darby will follow his Joan to the churchyard before the leaves have turned." There may be something in this; but large numbers of Darbies and Joans survive their partners for a considerable time and no notice is taken of it. The odds are that a few Darbies will soon follow their Joans to the grave when both have reached the allotted span,

and this is more likely to receive comment and be remembered.

The progress of psychological medicine must be based on something more than popular beliefs. If such beliefs have foundations in fact these need to be supported by the evidence of experienced pathologists and statisticians.

Bantry, Eire. LUCIUS NICHOLLS.

UNSTICKING SYRINGES

SIR,—I have found a double-socketed needle invariably successful in forcing out adherent barrels of syringes that have become occluded with a large variety of agents ranging from clotted protein to crystalline deposits.

The needle is constructed simply by filing the bevel off the shaft of one hypodermic needle and cutting off the entire shaft from the head of another needle. The shaftless head is then attached to the free end of the unbevelled shaft of the first needle with silver solder.

The stuck syringe is freed by forcing fluid into it from another syringe through the special needle. The greater the difference of diameter between the stuck syringe and the freeing syringe, the easier it is to apply considerable pressure inside the stuck syringe. For this reason a long 1-ml. syringe is the most useful pressure-pump.

Tap water is quite sufficient for syringes stuck with clotted protein, while liquid paraffin may be used for a syringe stuck with crystalline deposits.

There is no danger of breaking the syringe, and slight pressure has freed all stuck syringes in this laboratory almost immediately.

Department of Experimental Medicine, Cambridge. J. H. CORT.

RED CELLS IN ANIMALS

SIR,—In an annotation published in your issue of July 5 you discuss red cells in animals.

In cattle the red blood-cell count varies greatly not only between different animals but also in the same normal animal. The count may vary from 5 million to 13 million per c.mm. Changes occur regularly from day to day; and when plotted graphically these give a smooth curve. Furthermore, considerable changes occur in the course of a single day, and the red-cell count may vary by 2 million per c.mm. in a single hour.

With this rapid type of variation fall in the number of red cells is accompanied by reduction of the specific gravity of the plasma, and vice versa. Dried-weight estimations have shown that the reduced specific gravity is due to reduced content of solids. Plasma-volume estimations have shown that this reduction of solids is accompanied by an increase in volume of circulating plasma. The reduced red-cell count is, therefore, due to dilution of the plasma with fluid; and the volume of circulating erythrocytes in these cases is usually increased, not diminished.

When the plasma becomes diluted with fluid, a proportion of this passes into the red cells. This is easily demonstrated by mixing plasma of low specific gravity with cells separated from high-specific-gravity plasma: the specific gravity of the test plasma increases. Increase of fluid in the red-cells leads to increased mean corpuscular volume (M.C.V.), and the correlation between red-cell numbers and M.C.V. is easily explained. This also explains why the variation in the number of packed cells is less than that of the red-cell numbers.

During these changes total hæmoglobin varies remarkably little, because of variations in mean corpuscular hæmoglobin (M.C.H.); increased M.C.V. (with reduced red-cell count and reduced plasma specific gravity) is accompanied by increased M.C.H. I know that this will be considered heretical, but it undoubtedly occurs and can be demonstrated in another way. If plasma specific gravity is deducted from blood specific gravity, we get an index of red-cell weight. This shows a correlation with M.C.H., indicating that the increased hæmoglobin content is responsible for increasing the weight of the cells. On spectrographic examination, most cattle plasmas show traces of hæmoglobin. This was previously thought to be of traumatic origin, but possibly it may be due to physiological shedding by erythrocytes.

Intravenous injections of adrenaline into cattle often cause a fall of the red-cell count with the accompanying fall of plasma specific gravity. In other words the volume of the circulating blood is increased, but the fluid portion is increased to a greater extent than the cellular. The varying red-cell count in cattle, therefore, is connected with the control of water metabolism.

These findings have a wider significance than may at first sight be evident. In the first place, there would appear to be grounds for supposing that adaptation to hot climates and drought may be connected with control of water metabolism and may thus be reflected in the blood picture. In the second place, interference with the total volume of circulating plasma solids, not revealed by biochemical estimations, becomes apparent in diseases associated with anæmia.[1] The tissue degeneration of trypanosomiasis, malaria, and the kwashiorkor group of diseases can be explained much more reasonably by interference with deliveries of essential amino acids than by faulty delivery of oxygen. The anoxæmia of the "blue baby" does not cause tissue degeneration, whereas lack of methionine causes the typical centrilobular liver necrosis of trypanosomiasis. In trypanosomiasis we find further support for this view in vasodilatation and a much reduced circulation-time.

Some of these observations are to be described more fully elsewhere.

East African Veterinary Research Organisation, Veterinary Research Laboratory, P. O. Kabete, Kenya. R. N. T.-W.-FIENNES.

WITHDRAWAL OF TEACHING

SIR,—Your welcome leading article of Oct. 11 comes too late to influence the fate of the mobile film units of the Central Office of Information, but you did well to keep the issue alive. You rightly emphasise the value of the film as a teaching medium; this is still, I feel, largely unappreciated by medical teachers. The inconveniences which the new restrictions place in the way of the would-be user will further discourage medical teachers from adopting this powerful and convincing medium.

While not pretending that we can offer a substitute for the mobile film units, I would like to point out that the Central Council for Health Education does specialise in helping those engaged in medical and health education on questions of technique and media; and we would be glad to help any of your readers who may wish to consult us on this or other educational matters.

Central Council for Health Education, Tavistock House, London, W.C.1. JOHN BURTON Medical Director.

THE CORRECT SPELLING OF MEDICAL TERMS

SIR,—The editor of an important medical journal published in London (England) questioned my spelling of *fetus*. He refused to be interested in whether *fœtus* or *fetus* was etymologically the correct form, but said that if he printed *fetus* he would have a number of protests from his British readers complaining that he was adopting American spellings.

It is quite true that the spelling *fetus* is rarely used in British medical (or lay) literature. It is nevertheless the correct form. The *Shorter Oxford Dictionary* gives both *fœtus* and *fetus* but refers to the latter as the "better form"; it is from the Latin *fetus*.

Written English is built up by "common usage"—that is, in our view, common usage by British writers, most of whom are essentially conservative and resent change. They resent the liberties taken with their language by foreigners. For instance, they *like* diphthongs, tiresome though these may be to printers; with this point of view I am in complete agreement and I shall resist to the last ditch any movement for the general replacement of diphthongs by single vowels—the American practice. But when, etymologically, the

1. Feldman, H. A., Murphy, F. D. *J. clin. Invest.* 1945, **24**, 780.

foreigner is correct and we are wrong, it would seem that by adhering obstinately to a false diphthong we are weakening our case for maintaining our justifiable diphthongs in the face of contrary "common usage" by far more than half the English-writing world.

It is admittedly about 250 years since *fœtus* first crept into English writing, but is it not time that it was gently eased out again?

Silchester. L. EVERARD NAPIER.

CURE OF TOBACCO-SMOKING

SIR,—As a doctor's wife, I should like to put forward the case for the ordinary smoker.

Smokers enjoy smoking. They do it openly and happily; they hand cigarettes to each other and most of them have a favourite tobacconist's shop where they exchange local gossip. They are not drug-addicts furtively stupefying themselves, but merry fellows who like having a straw in the mouth because they have a common nostalgia for the idleness of the yokel.

Doctors have too high a standard of human behaviour and forget that few people reach a more advanced mental age than 13 or 14 years. Ordinary people very much miss sucking sweets or chewing grasses or biting their nails.

Animals luckily do not have to change their habits with advancing years, so that we can still see an old cat spending spare time in washing its paws or sharpening its claws, or a dog in scratching or in wagging its tail, as they did in youth; but we humans are left with nothing to do with our hands or feet or teeth in those long stretches of idleness from which we all suffer when travelling or entertaining our friends. Gradually therefore the accepted consolation has become the cigarette, the substitute for paw-washing or tail-wagging or nail-biting—the ideal straw in the mouth.

London, W.1. B. W. EDWARDS.

SIR,—"Vouloir c'est pouvoir," quoted by Professor Alstead (Sept. 27), is by no means always true, I fear, of stopping smoking—even when the *vouloir* is backed by quite a lot of *savoir*!

Professor Russ's "smoker" of dummy cigarettes (Oct. 14) is indeed a rare bird. I have not seen or previously heard of one. With the important proviso, *where there is no consumption of tobacco*, I agree that "smoking" is a habit (on a par with gum-chewing).

I can assure Dr. Geiringer (Oct. 11) that life for me is not simple, though my thesis on tobacco-smoking is; but that surely does not make it less true. He asks what is the cause of mass (drug) addictions. The answer is, I think, mass psychological infection, which I discussed at some length. He also asks what is the balance of the good and evil effects of such (drug) addictions, and of tobacco-smoking in particular. There is no real balance of the good effects of disease. To addicts, in the case of the drug addictions, there seems to be, because addicts have fairly fixed delusions of beneficence about the effects of their drug.

Mr. Leacock (Oct. 11) accuses me of classifying smoking "among the vices of addiction." I stated that tobacco-smoking was a drug addiction—anyone who repeatedly gives himself a drug for non-medicinal purposes is clearly addicted to it—but not a vice. The phase of "gluttony" which may follow cessation of smoking usually passes after a few months. To recommend smoking as a remedy for obesity is a therapeutic crime.

The great increase in cancer of lung, and its proved association with tobacco-smoking, have been powerfully stated by Dr. Horace Joules (Oct. 18). Dramatic and tragic though cancer of lung is, the harm it causes is, in my view, much less in the aggregate than the insidious, protracted, and extremely widespread harm caused by tobacco-smoking. Pearl's table, to which I referred (Sept. 6), lends support to this view. There is clearly but one real solution to this problem—our prevention of tobacco-smoking.

Wallasey, Cheshire. LENNOX JOHNSTON.

SIR,—May I recall the origin of the tobacco plant as recorded in the *Koran*? Mahomet, while taking a stroll, found a serpent crushed under a fallen rock. He freed the serpent, which promptly rewarded him by biting his arm. Mahomet sucked his wound and spat on the ground; immediately there bloomed the tobacco plant, which contains both the venom of the serpent and also Mahomet's mercy.

Perhaps a form of agreement may thus be established between Dr. Lennox Johnston and his correspondents.

Puteaux, Seine, France. WILFRID JOULLIÉ.

FIRST-AID TREATMENT FOR NERVE-GAS POISONING

SIR,—It has been brought to my attention that anti-gas ointment will not be issued to Civil Defence Services, and hence the advice given about decontamination in the penultimate paragraphs of the memorandum entitled Chief Characteristics of Nerve Gas with Notes on First-Aid Treatment, published in the issue of Aug. 9, may not always be apposite.

In circumstances (e.g., in civil life) where adequate supplies of water are available and the contaminated skin can be speedily and thoroughly cleansed, washing is an effective means of decontamination for both nerve and mustard gases. If speedily applied there is, in fact, no better method for nerve gas. In Civil Defence practice any liquid contamination on the skin is speedily removed by wet swabs, and treatment is continued by thorough washing with plenty of water and soap.

Anti-gas ointment is, however, provided for Service personnel, since under active field service conditions adequate water-supplies for washing may not always be immediately available.

H. M. GARNER
Ministry of Supply, London. Chief Scientist.

DANCKWERTS AWARD

SIR,—The many letters in medical journals concerning the Working Party Award have been most revealing, but it seems that one aspect has not been considered. Surely those who speak critically of "spoon-feeding young doctors" should consider more closely the difficulties of entering general practice today compared with before the late war.

Then, the young doctor could buy a practice and with it an established list of patients. Houses were easy to buy or to rent. Advances for purchase of both practice and house were not difficult to obtain. Having an established list, the young doctor was able through hard work to make himself appreciated by his patients and was therefore sure of recommendation to their friends. His practice grew by repute. Having risked his capital or pledged his future by mortgage he was reasonably sure of his bread and butter for many years ahead, even if his practice did not grow according to expectation.

Now, he must purchase a house, which will cost him as much as house and practice before the war. His capital is risked or his future mortgaged with no bread-and-butter list of patients to whom his care and hard work will recommend him. He is debarred from advertisement, and his initial practice allowance diminishes each year and ceases after three years.

There is no comparison in the risk. Formerly he had opportunity to show worth; now he has none. There may be in his neighbourhood several doctors with more than the maximum number of patients on their lists: patients will tend to go, not to an unknown unadvertised

doctor, but by repute from one of the established doctors to another.

This, taken in conjunction with the fact that despite the award it is still more profitable to have an assistant than to take a partner, suggests that the undesired increase of a salaried service within general practice is likely to continue.

Community Centre,
Farnham Road,
Slough, Bucks. M. E. M. HERFORD.

INJECTION ROUTINE IN OPERATING-THEATRES

SIR,—The possibility of confusing gas cylinders or drugs in an operating-theatre is still a cause of concern, and may be a considerable danger to patients.

Some pharmaceutical firms issue various drugs in identical containers; and a few days ago a patient escaped an injection of a curariform drug, instead of the analgesic I had ordered, only by chance. If the ampoules had had easily distinguishable labels such a mistake would have been impossible, even in a busy and short-staffed hospital.

Lisbon. LOPES SOARES.

*** The use of distinctive colours and labels for ampoules was discussed in our columns recently by Major-General W. E. R. Dimond and his colleagues.[1] They suggested that the risk of accidents could be reduced by colouring ampoules of certain injectable fluids used in operating-theatres. But there is an alternative view [2] that the only safeguard is to read and re-read the label, and that other devices for identification increase the danger of injecting the wrong substance. The question of gas cylinders has also been under consideration lately,[3] and a new code of colours is being introduced in this country.—ED. L.

THROMBOPHLEBITIS FOLLOWING INTRAVENOUS INFUSIONS

SIR,—In reply to the letter from Mr. Page and his colleagues (Oct. 18) it must be stated that in our study [4] the type of rubber tubing in the infusion sets was not controlled.

The investigation of thrombophlebitis in the surgical-unit wards began three years ago. At that time experience of a few latex sets was compared with experience of sets supplied by the North London Blood Transfusion Centre. The figures were small, but with the latex set the incidence of thrombophlebitis was no lower.

For the last two and a half years all investigations have been conducted with the standard North London Transfusion set. During this period the rubber tubing has been changed at least six times, and it was in fact changed three times during the investigation into the pH of the fluids. Despite these changes, since the introduction of the eight-hour time-limit two and a half years ago the incidence of thrombophlebitis has remained very constant.

The report by Handfield-Jones and Lewis [5] was published after the investigation into the pH of infusion fluids was completed. We propose to test the effects of different types of rubber tubing as the next step in our investigation.

With regard to the second point raised by Mr. Page and his colleagues, we found no difference in the incidence of thrombophlebitis with the fluid of pH either 5·6 or 6·05.

Surgical Unit,
University College Hospital
Medical School, London, W.C.1. J. F. BOLTON CARTER.

1. Dimond, W. E. R., Pollard, A., Adamson, A. C. *Lancet*, 1952, i, 410.
2. Trillwood, W. *Ibid*, p. 510.
3. See *Lancet*, July 5, 1952, p. 36.
4. Carter, J. F. B., Milne, E. H., Whittet, T. D. *Ibid*, Oct. 4, 1952, p. 660.
5. Handfield-Jones, R. P. C., Lewis, H. B. M. *Ibid*, 1952, i, 585.

EFFECTS OF LEUCOTOMY

SIR,—Your annotation of Oct. 18 on Mrs. Petrie's book, *Personality and the Frontal Lobes*, praises the care and industry of the work, as well as the lucid presentation, but then goes on to say that "the results are disappointing because almost nothing was found that had not been described before by numerous observers."

Two comments seem relevant. In the first place, clinical observation in this field, as in many others, had resulted in a plethora of descriptions which embraced almost every trait and behaviour syndrome known to the dictionary; frequently the effects postulated by one worker were the explicit opposite to those postulated by another. Under these circumstances, it is very difficult to see how any study could succeed in unearthing behaviour not previously described; it is by producing *proof* where previously we only had contradictory *opinions* that Mrs. Petrie's study is outstanding.

In the second place, even if nothing more had been done than to quantify already existing clinical belief, does such a feat really deserve to be considered "disappointing"? To compare small things with great, it might with equal justice be said that Newton, in his *Principia Mathematica*, did nothing but confirm the phenomena which "had been described before by numerous observers"—i.e., the fact that unsupported bodies tend to fall to the ground. Science proceeds by proof and systematisation; it does not necessarily require for its advancement that its detailed findings should not, up to a point, have been anticipated by common sense and clinical observation.

The importance of such quantification is best shown by another finding of Mrs. Petrie, which is dismissed in the annotation in one sentence: "The variation of operative procedure had little and only quantitative influence on the test results." But to be able to follow experimentally such relatively small changes in operative procedure is in itself an important achievement, and to demonstrate that differences are quantitative rather than qualitative is something that could not have been done convincingly on the basis of clinical observation.

In addition, no mention is made of one of the most important findings in the book, which has since been confirmed—namely, that intellectual deterioration only occurs after posterior operation. This result alone, with all its implications regarding the localisation of functions in the brain, would suffice to show that the sentence quoted in the last paragraph does not give an accurate impression of the consequences of variation of operative procedure.

Institute of Psychiatry,
Maudsley Hospital, London, S.E.5. H. J. EYSENCK.

BUTAZOLIDINE

SIR,—Having now used this drug in 237 cases of rheumatoid arthritis attending my outpatient clinics, I am still greatly impressed by its efficacy. I have used it alone, in combination with cortisone, and as a follow-on treatment after 'Irgapyrin.'

None of this series has shown any toxic effects other than (*a*) one case of rather severe gluteal abscess, and (*b*) a few mild macular rashes which have cleared up quickly on discontinuing the drug. In all cases the erythrocyte-sedimentation rate (E.S.R.), white blood-cell count, and platelets are kept under careful observation.

None of these patients has been given a larger dosage than 2 g. per week. (The usual dosage is 1 g. injected intramuscularly twice weekly for four weeks—this course is repeated after an interval of about a month.)

The toxic symptoms reported in your columns have nearly always followed administration of at least 1 g. of butazolidine *daily*, and it would therefore appear that this dosage is too high.

There can be little doubt as to the therapeutic value of butazolidine in rheumatoid arthritis; but the only safe

way to administer this drug would seem to be by injection so that the patient can be kept under constant observation and have his white blood-cell count, platelets, and E.S.R. continually reviewed.

The dangers of the tablet preparation are that: (*a*) the dose of 0·2 g. is rather large for repeated use, (*b*) digestive disturbances may occur, and (*c*) the doctor may lose personal control of the supervision of the patient.

I have recently seen two cases of massive œdema of the lower limbs following the use of butazolidine tablets (1·2 g. daily) prescribed by other practitioners.

Coventry and Warwickshire Hospital. JOHN SHULMAN,

SUBLINGUAL HEPARIN

SIR,—Last year Litwins et al.[1] claimed to have increased blood-clotting time by sublingual administration of sodium heparin (125 mg.) in the form of wafers. Clotting-time reached "therapeutic levels" within 30 minutes and were maintained for 4 hours. These workers rightly pointed out the advantages of this mode of administration, especially for the treatment of frost-bite in soldiers on active service.

Because of the importance of this claim we decided to duplicate these experiments in animals.

Rabbits were anæsthetised with sodium pentobarbitone and urethane, and clotting-times were determined on samples of blood taken from the carotid arteries. Intravenous administration of sodium heparin, 1 mg. per kg. body-weight, gave an average clotting-time of 30 minutes, the peak being reached within 10 minutes. With double this dose the average peak was raised to 160 minutes. Intramuscular injection of 10 mg. per kg body-weight raised the clotting-time to about 40 minutes; the plateau was reached within 1 hour and showed no signs of decay after a further 3 hours. Sublingual administration in rabbits anæsthetised with sodium pentobarbitone and urethane had no significant effect on the clotting-time at a level of 10 mg. per kg. body-weight. Doubling the dose had the effect of doubling the normal clotting-time, but in no instance was the "therapeutic level" (20 minutes or more) reached. Likewise oral administration was ineffective.

Since the effect of parenteral administration of heparin in the rabbit resembles that in man, it is not unreasonable to assume that the effect of sublingual administration of heparin in man would be similar to that observed in the rabbit. We therefore concluded that, even should it prove possible to reach the therapeutic levels defined by Litwins and his colleagues with their suggested method of therapy, the dosage required would be massive and the cost prohibitive.

While preparing this work for publication, we were somewhat relieved to see a report by McDevitt et al.,[2] who have also been unable to substantiate Litwins's claim. Consequently we decided that detailed publication of our work was no longer necessary.

Pharmacology Unit,
Glaxo Laboratories Limited,
Greenford, Middlesex. E. G. TOMICH
J. E. WOOLLETT.

ANTITHYROID ACTION OF P.A.S.

SIR,—I much appreciate the comments of Dr. Benstock and Dr. Freedman in your issue of Oct. 4.

If, however, it is conceded that all antithyroid drugs act by inhibiting the synthesis of thyroxine in the gland itself and that the enlargement is compensatory and due to the influence of pituitary *thyrotropic* hormone, why should we postulate that the action of P.A.S. should be different and involve a different pituitary hormone—the adrenocorticotrophic one? Unless, of course, one goes a stage further and revives the old hypothesis that there is really only *one* pituitary hormone. The various known fractions could therefore be merely artificial substances created by modern chemical and other techniques!

The exact nature of salicylate action is still subjudice. Until it is finally elucidated, I respectfully suggest that the current concept of antithyroid drug action is equally compatible.

Ilford Isolation Hospital,
Romford, Essex. I. M. LIBRACH,
Medical Officer in Charge.

1. Litwins, J., Vorzimer, J. J., Sussman, L. N., Applezweig, N., Etess, A. D. *Proc. Soc. exp. Biol., N.Y.* 1951, **77**, 325.
2. McDevitt, E., Huebner, R. D., Wright, I. S. *J. Amer. med. Ass.* 1952, **148**, 1123.

Parliament

Flogging for Crimes of Violence

IN the House of Lords on Oct. 22, EARL HOWE called attention to the continuation of crimes of violence towards women and other defenceless persons, and asked whether the existing penalties which the courts had power to inflict were adequate to protect the public. The number of indictable offences known to the police had risen from 283,220 in 1938 to 524,506 in 1951. He suggested that there was more consideration for the gangster than for his victim. The abolition of flogging in 1948 had been described as a great experiment and we were told that it had not yet proceeded far enough to be judged. But, he asked, how many women had to be attacked in circumstances of the utmost brutality before the experiment ended and the public were given the protection to which they were entitled?

Lord GODDARD pointed out that serious crime in this country had increased to such an extent that the criminal work to be done at assizes bade fair to throw the whole legal machine out of gear. He agreed that it was a bad thing to be constantly interfering with the penalties prescribed by law; he believed the time had come when we must consider whether it was not time to re-impose corporal punishment for certain offences, for new and horrible forms of violence were being used. As a judge he disliked having to sentence a young man of 21 or 22 to a long term of imprisonment. Formerly corporal punishment could only be inflicted, with one or two exceptions, for robbery with violence. He suggested that the superior courts should be given power in their discretion to inflict corporal punishment for all forms of felonious violence—not for unlawful wounding, but for felonious wounding, wounding of police while resisting arrest, and attempted murder. He did not want to see the use of the cat reintroduced, and did not believe in the indiscriminate use of the birch. Nor did he believe the reintroduction of corporal punishment would do away with crime, but it might substantially reduce it.

Lord SIMONDS, the Lord Chancellor, said that against the background of a century of penal reform their Lordships were now asked not only to reverse the legislation of 1948 but to extend the penalty of corporal punishment to a degree which surpassed anything that had been permissible for the last 130 years. Was not that in the nature of panic legislation? He was not in a position to say that the Government would introduce such legislation. He asked that the system instituted by the Criminal Justice Act 1948 should be given a fair trial. It provided for preventive detention for persons over thirty for 5 to 14 years, if it was expedient for the protection of the public, and there were now 868 men and 28 women under such detention. Many causes had contributed to the increase in crime; the relaxing of family discipline, the lowering of the general moral standard, and perhaps the failure of religious sanction, were causes. How large a part they played no-one could say, but the Home Secretary thought that the Act should be given a longer trial before they decided to take the step which had been advocated that day.

QUESTION TIME

B.C.G. Vaccination

Dr. BARNETT STROSS asked the Minister of Health what classes of the population were advised to receive protective vaccination by B.C.G. against tuberculosis; and for what reasons this service was not extended to those leaving school.—Mr. IAIN MACLEOD replied: B.C.G. vaccination is at present offered to hospital nurses, medical students, and, at the discretion of chest

physicians or other appropriate specialists, to other individuals at special and known risk. Its use in the immunisation of children leaving school is at present the subject of a trial being conducted by the Medical Research Council.

Replying to further questions Mr. Macleod said he feared that the rate of experimentation with B.C.G. vaccine was slow, but in Scandinavia medical opinion was by no means unanimous about its effectiveness, and the Medical Research Council in this country were not yet satisfied that its full effectiveness had been proved.

Mr. P. F. REMNANT: Is the Minister aware that a very considerable body of opinion in this country, including eminent medical opinion, agrees with this vaccine, and will he see that he is not thwarted by any dilatoriness on the part of the Medical Research Council?—Mr. MACLEOD: It is true that there is a big body of medical opinion in favour of pressing on faster than we are doing with B.C.G., but there is also a large body of medical opinion which holds that we should wait until we know fully whether it will be effective. Dr. STROSS: Would not the Minister agree that the percentage of reactors among school-leavers is showing an increase, and that the school population therefore shows itself to be more susceptible when leaving school now than formerly? Is that not an important factor?—Mr. MACLEOD: It is a very important factor, and is probably the most valuable field of all for experimentation. The Medical Research Council are, in fact, experimenting in that field now. Mr. SOMERVILLE HASTINGS: Is there not a considerable danger in encouraging people to trust to vaccine instead of hygiene and the laws of Nature? No further reply was given.

Assistants' Salaries

Mrs. JEAN MANN asked the Minister what portion of the Danckwerts award would be passed on to doctors' assistants and trainee apprentices; and how far, in view of this award, he considered it necessary to continue payments to doctors for trainee assistants.—Mr. MACLEOD replied: I cannot say what adjustments in the light of the Danckwerts award will be made in the salaries of assistants, which is a matter for the doctors who employ them. No changes are at present under consideration in the arrangements for paying grants to doctors who supervise the training of assistants.

Mrs. MANN: Would the Minister consider making changes in view of the fact that when the Danckwerts recommendations were originally put forward there was no Government grant of £1000 to doctors for what are really locums who help them in their work?—Mr. MACLEOD: I would not agree that this is just a subsidy to locums. I think it has very much more value than that. Both the original scheme and, in consequence, the Danckwerts award were attached to principals, and not to assistants.

Major E. G. R. LLOYD: Is the Minister aware that there is some difference of opinion in the medical profession as to how these sums of money should be allocated? Will he consider representations on this subject before the final recommendations are approved by the Government?—Mr. MACLEOD: I have already started implementing the award of the Danckwerts money. It was passed without comment by the House of Commons before the summer recess, but I shall be happy to consider any representations which are made on this important matter.

Hospital Construction

Replying to a question Mr. MACLEOD stated that the capital cost of new hospital construction and extensions, together with the number of additional beds to be provided, in schemes approved by his department since October, 1951, in England and Wales was £5,100,000. The corresponding figure for the previous year was £7,500,000.

Traumatic Surgery

Mr. HASTINGS asked the Minister what arrangements he had made in cases of emergency, such as the railway disaster at Harrow, to draft doctors with specialised experience in traumatic surgery to hospitals in the immediate vicinity, so that the best known treatment might become available to sufferers.—Mr. MACLEOD replied: I am sure the hon. member will agree that the medical aid rendered in this disaster was prompt and efficient. The general surgeons at the hospitals concerned, though not specialists, are experienced in traumatic work. Further help of this nature was offered but not required. The tragedy will be closely studied to see what lessons can be learnt from it. Mr. HASTINGS: Does the Minister realise that traumatic surgery is a specialty of its own? As an instance of that, there are several accident hospitals. Is it not of the greatest importance that people who suffer unexpectedly in this way should in all cases have the very best treatment?—Mr. MACLEOD: I have great sympathy with the hon. member's point of view, but, as I pointed out in my answer, such skilled specialist help was offered and in this case was not required. We will certainly see if there are any lessons that we can learn from this disaster.

Visits to Children in Hospital

Replying to a question, Mr. MACLEOD stated that of the 1300 hospitals admitting children, all except 70 fever hospitals and 75 others allowed regular visiting; 300 allowed daily visits, and the great majority of the remainder allowed visits more than once a week.

Mental Hospitals Accommodation

Replying to a question, Mr. MACLEOD stated that on Jan. 1, 1952, the bed space in use in mental hospitals was overcrowded by 16,000 patients, an average of 13·5%. At the same date the number of unstaffed beds was 1700. The present shortage of staff was about 3500 men and 7700 women. A year ago it was estimated at about 3000 men and 8000 women. The problem was being closely studied by the Mental Health Advisory Committee of the Ministry of Health.

Health-centre Schemes

Replying to a question, Mr. MACLEOD said that since October, 1951, one health-centre scheme had been approved, and this centre and two others approved before that date had been completed.

New Treatment for Cataract?

Mr. J. A. SPARKS asked the Minister what steps he was taking to make available to persons suffering from cataract blindness the new cure discovered by the New York Cataract Institute in the use, by injection, of protein substances from the lenses of fishes' eyes.—Mr. MACLEOD replied: I am advised that the claims made for this treatment are so far unsubstantiated.

Toxic Effects of Detergents

Dr. STROSS asked the Minister what evidence was available of the toxic effects following the use of detergents in cleansing glass and crockery; and what figures he had as to the incidence of dermatitis following their use.—Mr. MACLEOD replied: I am not aware of any. Dr. STROSS: Has the Minister not been made aware that detergents tend to cause dermatitis, chapped hands, and so on? Is he not aware that it is agreed that if glasses and crockery are not adequately washed after being dipped into detergents a cumulative dose is gradually taken into the human body and that that is not good for it?—Mr. MACLEOD: I do not dispute that, but that is not the question that I have been asked. I have inquired from the Minister of Labour and the Minister of National Insurance and they have no such evidence as was referred to in the question.

Foot-and-mouth Disease

In the House of Lords on Oct. 21, replying to the EARL OF LISTOWEL, Lord CARRINGTON, joint parliamentary secretary to the Ministry of Agriculture, said that in recent weeks the amount of foot-and-mouth disease in this country had been so much reduced that after midnight of that day, if all went well, there would be only one infected area left. In September there were 13 outbreaks, compared with 19 in August and 51 in July. So far in October, there had been only 3 outbreaks, all in Hampshire, and no outbreaks had been reported since Oct. 6. Since Nov. 1, 1951, there had been 582 outbreaks in all, and the compensation payable to farmers amounted to about £2,738,000. On the whole, the position in Western Europe was much less ominous than a year ago, and there was at present no reason to expect this autumn a major invasion of the disease from the Continent such as was experienced last autumn and earlier this year.

He added that at an international conference convened by the Food and Agriculture Organisation of the United Nations at which 13 European countries, including the United Kingdom, were represented, it was agreed to recommend that a European Commission for foot-and-mouth disease should be appointed to stimulate and coördinate national and international control of this disease. This recommendation still had to be studied in detail by the governments concerned, but a body of this kind could, he thought, do much to prevent

a repetition of last year's disastrous epidemic in Europe and minimise the risk of disease spreading to this country.

Vitamins in Food

Replying to Dr. STROSS, Mr. MACLEOD, Minister of Health, said that the report of the Standing Committee on Medical and Nutritional Problems on the possibility of excessive consumption of vitamins due to food fortified by these substances had been referred to the departments concerned for their consideration. It appeared from the report that in present circumstances there was no danger of excessive consumption of vitamins due to food fortified with these substances.

Children and Tuberculosis

In answer to a question Mr. MACLEOD stated that a survey conducted by a committee of the Medical Research Council in 1949–50 in 22 selected areas on a sample basis showed that 56·1%, over all, of children aged fourteen and 48·5% of those aged fifteen to sixteen were tuberculin-negative, and that there was some evidence that these percentages were increasing.

Public Health

Shortage of Health Visitors

THE public-health section of the Royal College of Nursing thinks that the present complement of health visitors is quite inadequate to carry out the wider duties implicit in the National Health Service Act. Where the annual number of new recruits should be 900 it is now little more than 500, and some 25% of places in approved centres are not taken up. In addition, and partly as a result of this shortage the health visitor's proper sphere is being invaded (it is felt) by a host of other workers with a shorter training and higher remuneration. Though this discrepancy in pay is certainly a contributory factor, the main deterrent to newcomers to the service is believed to be the sense of frustration and disillusionment to be found among the health visitors themselves.

The council of the college is asking the Minister of Health to set up a committee to review the training, employment, and prospects of the health visitor, and to clarify not only her position under the local health authority but that of others working in kindred fields and also fields which the health visitor feels to be her own. The Minister will shortly have the results of the Nuffield analysis of the work on which the health visitor is at present engaged; and the moment is appropriate in view of his recent pronouncements on the need to strengthen the clinic, domiciliary, and family-doctor services as a means of relieving pressure on costly hospital beds. Much has been done to improve the position of hospital nurses, but too little, it is felt, to capture the imagination of possible recruits to public-health nursing.

Examination of Coalminers

Draft regulations issued by the Minister of Fuel and Power (Coal Mines [Medical Examinations] General Regulations, 1952) lay down that all those under 21 entering employment in or about coalmines shall be medically examined, with certain exceptions. The regulations prohibit the employment of anyone in work for which he is found on examination to be unfit. The draft regulations do not specify the form of examination, nor do they mention repeated examinations throughout the period of employment.

Statistics for England and Wales

In England and Wales during the June quarter[1] the birth-rate was 16·0 per 1000 population. This was the lowest rate since 1942; the average for the five years 1946–50 was 18·8. The stillbirth-rate—22·4 per 1000 live and still births—was the lowest ever recorded for a June quarter in this country. The death-rate was 10·6 per 1000 population, compared with 11·1 in the two previous June quarters. The infant-mortality rate of 25·1 per 1000 related live births represented a drop of 3·6 from the rate in the June quarter of 1951, and was the lowest yet recorded for the quarter in this country. The excess of births over deaths was 58,683, compared with 72,066, 60,552, and 59,660 in the June quarters of 1949, 1950, and 1951.

The Registrar-General has also reported provisional figures for the third quarter,[2] which, together with the corresponding figures for earlier years, are as follows:

Third quarter of	*Live births per 1000 pop.*	*Stillbirths per 1000 total live and still births*	*Deaths per 1000 pop.*	*Deaths of infants under 1 yr. per 1000 related live births*
1952	15·3	21·5	9·0	23·0
1951	15·2	21·8	9·1	23·4
1950	15·4	22·5	9·3	23·9
1938	15·2	37·0	9·9	42·5

Thus the fall in the birth-rate since 1947 has been arrested. The death-rate was the lowest since the September quarter of 1947. Both the stillbirth-rate and the infant-mortality rate were the lowest ever recorded for any quarter in this country.

Infective Hepatitis in the U.S.A.

In the U.S.A. the total number of cases of infective hepatitis in the thirty-nine weeks of this year up to Oct. 4 is provisionally estimated at 11,868.[3] The incidence was highest in the winter and spring months, and in the States of Alabama, Georgia, Kentucky, and West Virginia. Epidemics have been reported most often from States with large rural populations, and commonly in schools. In two outbreaks water was regarded as the vehicle of infection; but in most instances epidemiological evidence has pointed to person-to-person spread. In one instance handling of soiled linen used by infectious patients in hospital seems to have been the means of transmitting infection.

Obituary

WILFRED WATKINS-PITCHFORD

M.D. Lond., LL.D. Witwatersrand, F.R.C.S., D.P.H.

Dr. Watkins-Pitchford, the first director of the South African Institute for Medical Research and a former vice-president of the British Medical Association, died on Sept. 29 at the age of 84.

He was educated at St. Olave's Grammar School in Southwark, where his father was vicar of St. Jude's, and in 1891 he qualified from St. Thomas's Hospital. After holding resident appointments there he took his F.R.C.S. in 1897, but he was deflected from a possible career in surgery by the offer of an appointment in Natal, where his brother Lieut.-Colonel Herbert Watkins-Pitchford was chief veterinary officer. He spent the next few years advising the government of Natal on the plans for the establishment of their new bacteriological laboratory. In 1898 he was appointed as a special plague officer to the government of Bombay. After serving as a civil surgeon during the Boer War he returned to England in 1901, to take the D.P.H. at Oxford. While he was at home the smallpox epidemic of 1902 occurred, and in view of his experience in the Far East he was appointed consultant to the London County Council. The same year he took his M.D. Lond. in State medicine.

Shortly afterwards he returned to Natal as assistant bacteriologist to the government, and in 1907 he became pathologist and analyst. In 1911 he moved to Johannesburg, where he became government pathologist and bacteriologist to the Transvaal. He also held the posts of municipal public analyst and of honorary pathologist to the Johannesburg General Hospital.

When the South African Institute for Medical Research was set up in 1912 he was appointed its director. In 1914 he published a monograph on *Industrial Diseases of South Africa*, and when the Miners' Phthisis Board was formed in 1916 he became chairman of the medical bureau. His contributions on silicosis, published in the annual reports of the board, described what was at that

1. Registrar-General's Quarterly Return for England and Wales: Quarter ended June 30, 1952. H.M. Stationery Office. Pp. 27. 2s. 6d.
2. Registrar-General's Weekly return for England and Wales: Week ended Oct. 18, 1952. H.M. Stationery Office. Pp. 20. 1s.
3. Morbidity and Mortality: Weekly Report, Federal Security Agency, Public Health Service; Oct. 10, 1952.

time the most comprehensive and intensive inquiry ever made into the occurrence of any disease.

During the 1914–18 war Watkins-Pitchford added to his heavy burden of work the task of editing the *South African Medical Journal*. He saw bacteriology as a discipline of the science of preventive medicine, and his appointments outside his specialty included membership of the Union of South Africa's Council of Public Health and Leprosy Advisory Committee. He was also honorary professor of pathology and bacteriology in the University of Witwatersrand, and on his retirement in 1926 he received from it the honorary degree of LL.D. His work for the British Medical Association during his years in South Africa was recognised by his appointment as vice-president in 1923.

On his return to England he settled at Bridgnorth in Shropshire, where his friends were able to watch with pleasure the improvement in his health and the increasingly active part he was able to take in local affairs.

A. J. O. writes: "Two outstanding services were rendered by Wilfred Watkins-Pitchford: he was the first director of the South African Institute for Medical Research, and he was the first chairman of the Miners' Phthisis Medical Bureau. When he was appointed director of the S.A.I.M.R. there was a fine building designed by the late Sir Herbert Baker, a small amount of elementary equipment, and no staff. Soon there was a staff of half a dozen. From this grew the present great institute. When he retired Watkins-Pitchford left the institute in full swing. The Medical Bureau was established in 1916, the first institution of its kind in the world. It was, and still is, the sole authority for the medical examinations of miners, pre-employment, periodical, and for certification of the presence and degree of silicosis. With the late Louis Irvine, Watkins-Pitchford laid down the plan of work for the bureau which for many years continued to function admirably. A modest man of much personal charm and kindness, he had many friends in South Africa, few of whom, alas, are still alive."

Dr. Watkins-Pitchford married in 1905 Olive Mary Nicholl. They had a daughter, and a son who is a doctor.

Sir TRENT CHAMPION de CRESPIGNY, D.S.O., F.R.C.P., a former president of the Royal Australasian College of Physicians, died at his home at Adelaide, on Oct. 27, at the age of 70. For many years he was dean of the faculty of medicine of Adelaide University, and he was also chairman of the council of the Institute of Medical and Veterinary Science of Adelaide.

Births, Marriages, and Deaths

BIRTHS

BROMFIELD.—On Oct. 22, at the Canadian Red Cross Memorial Hospital, Taplow, Bucks, to Anne (née Powell), wife of Dr. Frank Bromfield—a son.

FISHER.—On Oct. 12, to Sylvia, wife of Dr. J. A. Fisher, of Clonelly, Magherafelt, co. Derry—a daughter.

LITTLEWOOD.—On Oct. 15, to Elizabeth, wife of Dr. Arthur William Littlewood, of Gillits, Natal, South Africa—a daughter.

MILTON.—On Oct. 19, at Southchurch, Haslemere, to Joan, wife of Dr. R. Milton—a son.

WALKER.—On Oct. 19, to Elizabeth (née Barton), wife of Dr. Richard Walker, of Whitchurch, Hants—a son.

MARRIAGES

MACDONALD—DAVIES.—On Oct. 18, at Bolney, Sussex, Duncan Donald Macdonald, M.B., to Rosemary Ann Davies.

RUTHERFORD—TOMLINSON.—On Oct. 18, at Chiswick, Geoffrey Temple Rutherford, M.B., to Teresa Elizabeth Tomlinson.

DEATHS

BAYON.—On Oct. 20, at Little Shelford, Cambridge, Henry Peter Bayon, M.D. Genoa and Cape Town, PH.D. Camb.

BURT-WHITE.—On Oct. 20, at Salisbury, Harold John Burt-White, M.D. Lond., F.R.C.S., M.R.C.O.G.

EASTERBROOK.—On Oct. 25, at Gowanbrae, Eskbank, Dalkeith, Midlothian, Alexander Maitland Easterbrook, M.B. Edin., aged 83.

REDMOND-HENDERSON.—On Oct. 21, Sidney Redmond-Henderson, husband of Dr. Winifred Redmond-Henderson.

SILLAR.—On Oct. 23, William Cameron Sillar, M.D., B.SC. Edin., of the Gables, Wheatley, Oxon, aged 88.

SMEED.—On Oct. 25, Edward Smeed, M.R.C.S.

TALENT.—On Oct. 17, at Newlands, Grange over Sands, John William Talent, M.D. Edin.

THOMAS.—On Oct. 19, Frank Leslie Thomas, M.B. Lond., of the Square, Barnstaple.

WALKER.—On Oct. 21, at Springbank, New North Road, Huddersfield, Albert Edward Walker, M.B.E., M.D. Edin., aged 89.

Notes and News

ALCHEMY

"Let chemists toil like asses," Gay's highwaymen sing, "Our fire their fire surpasses, and turns all our lead to gold." We, who know at last that metals really can be transmuted, declining from uranium to lead, are yet apt to wonder at the passion with which our learned ancestors, with very little to go on, believed in the Philosophers' Stone. And indeed the mystery which hangs about alchemy is real and strange, as Mr. F. Sherwood Taylor, PH.D., makes clear in his little book, *The Alchemists*,[1] For one thing, only the meaner sort among them were seeking gold. The true alchemists were feeling their way blindly towards perfection—of the base metal, certainly, but also and chiefly of their own natures. Moreover, they believed it to be a lost perfection, which men had once known how to recover. Where we are looking anxiously forward they were looking nostalgically back. No-one could hope to be an alchemist until he had been instructed by a master of the art; for though there were texts available—some ancient and of great authority—which gave recipes for making the red and the white stones, with their marvellous properties, they were written in a style so deliberately obscure that the uninitiated could not understand them. Even now it is impossible to decipher more than a fraction of their meaning. Yet after instruction, it seems, the neophyte could follow them without difficulty. That is not to say he was forthwith in reach of making the Philosophers' Stone. The method was so lengthy and the risks to apparatus so formidable that he was likely to spend years in failing and starting afresh—years which he expected to use in preparing himself spiritually for the responsibilities of success. It is not possible for us to suppose that anyone ever succeeded; yet there are circumstantial accounts by those who say either that they did, or that they were given a tiny particle of the stone by an alchemist and worked the marvel of transmutation with it. Of course they had no exact means for assaying gold—which accounts for the readiness with which they accepted recipes for "doubling" gold (actually by debasing it with other metals in alloy).

Alchemy is often said to be the forerunner of chemistry; and certainly the alchemists had opportunities to observe a multiplicity of chemical reactions. Their attention, however, was elsewhere, and they have left us no record of these changes. What they did bequeath us was some first-class laboratory equipment—stills, flasks, furnaces, lamps, water-baths, ash baths, reverberatory furnaces, crucibles, dishes, beakers, pestles and mortars, strainers, filters, stirring-rods, and much other convenient apparatus still in use today. They had no conception of the freemasonry among scientists which we are now losing, and which made every new discovery the common property of the scientific world. But then, their reason for secrecy was a better one than ours: they feared that if knowledge of the art was put within reach of unscrupulous men, it might not be used for the glory of God and the benefit of mankind.

EMERGENCY BED SERVICE

THIS year, during the winter months, we shall again be publishing in our news columns figures showing the number of applications for beds for acute cases dealt with each week by the London Emergency Bed Service. The applications include those from general practitioners and from hospitals wishing to transfer patients from their casualty outpatient departments. The gap between the number of applications and the number of admissions is not composed entirely of cases that fail to be admitted: some cases are withdrawn by the doctor or the hospital while the service is still looking for a bed, and some patients refuse to go to hospital when a bed has been found, or die before admission.

HOSPITALS YEAR BOOK

ANOTHER October has brought a new edition of the Institute of Hospital Administrators' yearbook (obtainable from the Institute, 35, Portland Place, London, W.1: 1952. Pp. 1402. 45*s*.), and, though there may be more exciting reading for fireside evenings, anyone who is interested in our health services will find in its pages many useful facts set out in easily accessible form. The addresses and names of the chief officers of the bodies which administer the health service are given, from the Ministry in Whitehall to the executive council in Zetland and the hospital management committee at Morgannwg, and the list of less formal voluntary bodies who

1. London: Heinemann. 1952. Pp. 246. 12*s*. 6*d*.

lend a valuable helping hand ranges from ASLIB to the W.V.S. In the section on reference information for the hospital administrator the value of the list of statutory instruments, memoranda, and circulars is increased by a useful index. As Mr. J. F. Milne, the editor, in his opening survey points out, it would be unfortunate if the present natural and perhaps inevitable concentration of interest on finance were allowed "to obscure the achievements which the national hospital service, in the comparatively short space of four years, has already to its credit." In offering so much useful information about our health services the yearbook reminds us that there is now a good deal to be informative about.

HEBERDEN SOCIETY

ON Oct. 25, Lord Horder delivered the Heberden oration taking as his subject Rheumatism—a National Problem. Sir Henry Cohen, the president of the Society, presented the Heberden medal to Lord Horder for his original observations and research in rheumatism.

DIRECTORY OF RESEARCH

IN 1946 a list of the research being carried out in British universities was prepared for an Empire scientific conference. The list was taken over by the British Council for its own use, but there have been so many requests for copies that the Department of Scientific and Industrial Research has now arranged to publish it each year. The British Council will continue to collect the material. *Scientific Research in British Universities 1951–2*, which is now available from the Stationery Office (8*s*., by post 8*s*. 6*d*.) gives details of research work in universities and colleges in the United Kingdom. It covers all fields of science and technology, including medicine. The names of the staff working on each problem and enough description to show the scope of the research are given in the main list, which is arranged according to university. There is also an index of names at the end so that any worker may be easily traced to his academic base.

FRIENDS' WORK

IN *Quaker Relief*[1] Mr. Roger Wilson, general secretary of the Friends Relief Service, modestly but effectively describes the many kinds of work which some 1200 men and women chose as an acceptable way of rendering their National Service other than in the Armed Forces. Not all of them were Quakers, but all had accepted the full implications of the pacifist rôle, and they were allowed to do this service as conscientious objectors. He explains a good deal about the background of committees, for nothing goes on its sober Quaker path without the appropriate committee backing. But delightful touches tell us of how, here and there, the headstrong team, or individual, would act first, and see about the permission later; and it seems as if the general secretary was able to suit his blind or watchful eye to every occasion.

In this country the work was usually some form of social service—among hop-pickers, among evacuees, in air-raid shelters, or for new settlers on housing estates. Abroad, teams, largely of American Friends, helped refugees after the Spanish Civil War and from Alsace in 1940. The Friends Ambulance relief team worked with the 21st Army Group, alongside the British Red Cross. In Greece a domestic school for girls remains a very successful piece of work. Episodes in Germany, Austria, Holland, Poland, and (outside Europe) Palestine and East Africa round off a tale of absorbing interest.

The members of the relief service, by the ability to live and work together, to forego comfortable living, and to share physical discomfort with their victims, gave their work a particular quality of sincerity and effectiveness. Reading this book one is reminded of Bunyan's hymn: "He who would valiant be, 'gainst all disaster." And what a telling quality valiance has in a disaster.

FILM ON HEMIBALLISMUS

A COLOUR film on *Hemiballismus in a Woman aged 71 Years* records the case of an old lady with severe choreiform movements of one side of the body. The movements are well shown, and there is a diagram depicting the site of the lesion in the subthalamic nucleus. Although some of the shots are rather long and some are reduplicated, this is nevertheless an excellent teaching film. The film (16 mm., silent) was made in 1950 for the National Hospital, Queen Square, by the department of medical illustration, Guy's Hospital, London.

1. London. Allen & Unwin. 1952. Pp. 350. 15*s*.

A NEW JOURNAL OF PROJECTIVE TECHNIQUES

THE origins of the Rorschach test are to be found in several countries: the doctor-poet Justinus Kerner published his book on *Kleksographien* in Germany a hundred years ago; Alfred Binet provided a French contribution in 1895; and since Rorschach's brilliant work, investigators in America, England, and many other countries have illuminated the subject. Articles have appeared in widespread journals, including the *Rorschach Research Exchange* (now known as the *Journal of Projective Techniques*). The appearance of *Rorschachiana*, an international review of Rorschach and other projective techniques (Berne and Stuttgart: Huber) is to be welcomed, for it was in Switzerland that the notable studies of Hermann Rorschach were carried out. This well-produced quarterly has a strong Swiss backing but a widely representative editorial board, and should provide a forum not only for Rorschach studies but for reports on other projective methods developed since his untimely death. The languages to be used will be English, French, German, and Latin (and possibly also Spanish). In the opening number there are instructive contributions by Professor Bleuler, Dr. Loosli-Usteri, and Dr. Kadinsky, in the three main languages of today; except on the front page and the last, there is nothing to suggest that readers of the journal need to brace themselves forthwith for a tussle with the Latin periods of some expert reared in the grand traditions; at all events, since Mr. K. W. Bash, the editor, threatens to reject any paper that is not "stilistically correct," there is no danger that the writers of a debased Silver Age style—"Ulpian at the best"—will be allowed to affront the international Rorschach public.

THE EVOLUTION OF PLANTS

CERTAIN non-living chemical substances can interact to produce other substances very difficult to distinguish from living matter. Protein is supposed to have arisen in this way. If a particle of protein interacted with other substances to form more protein like itself it would be a virus. If this was indeed the way in which living organisms first came into being, it means that the earliest of them were not autotrophic (making their organic food from inorganic substances) but heterotrophic (obtaining their organic food from organic material) and that autotrophic organisms evolved from heterotrophic. Possibly some heterotrophic organisms gradually acquired the power of setting up chain reactions, and such an organism would gain if it could prevent dispersal of the products of earlier reactions in the chain likely to be required for the later reactions. Thus any organism which acquired a protective envelope would have a better chance of survival than most, and this would be the beginning of the cell and its semipermeable membrane.

The next step would be towards sexual reproduction, which enormously increases the rate of evolution by natural selection. Every organism that reproduces sexually has its life-cycle divided into two parts—haploid, with single chromosomes; and diploid, with double chromosomes. But these parts are not equal. In almost all animals the organism is mainly diploid, with but a brief haploid phase without mitosis. In many of the simpler plants the opposite is true, but in most plants both haploid and diploid cells undergo mitosis (alternation of generations). These facts suggest that sexual reproduction evolved before animals and plants diverged from one another—in fact, in a unicellular organism. The simplest form of sexual reproduction would be the fusion of two unicellular haploid organisms to form a diploid one, followed by meiosis producing haploids, and *da capo*.

A multiplicity of algal types shows that before vegetable life invaded the dry land it had undergone a long and complicated evolution. Whitehouse[1] suggests that the land plants have evolved from a fresh-water plant with a protected egg-cell enabling it to withstand a period of drought. The three classes of land plants—(1) mosses and liverworts, (2) ferns, club-mosses, and horsetails, and (3) seed-plants—have in common five important features: a protected egg-cell, alternation of generations, a cuticle, stomata, and air-spaces. Algæ do not share these features, which suggests that land plants are not descended from algæ but from a common ancestor shared with algæ. Of the three classes of successful land plants the mosses and liverworts "still show traces of their aquatic ancestry in their mode of fertilisation, and in this respect may be regarded as incompletely adapted for life on

1. Whitehouse, H. L. K. Botany from the Beginning. Thrift Books No. 20. London: C. A. Watts & Co. Ltd. 1952. 1*s*. 6*d*.

land." Whitehouse calls them "a blind alley of evolution." In them the haploid phase predominates over the diploid.

The final step in botanical evolution was the development of seed-plants. The elaboration of the haploid phase in mosses and liverworts rendered these plants incapable of eliminating the need for external water. The abbreviation of the haploid phase enabled the ferns to evolve into seed-plants. This was done by developing two kinds of sporangia, one containing large female spores with a plentiful food-supply, and the other containing small male spores. Sometimes the female spores were retained on the diploid plant, their food being supplied direct from the parent; then, for fertilisation to take place, the male spores must germinate near the female sporangia and not on the ground. Such features can be recognised in fossils of the Carboniferous age (c. 300 million years ago). In the succeeding Permian age (c. 250 million years ago) the reproductive method had evolved still further. The female sporangia were protected by an integument, forming *ovules* which, after fertilisation by male spermatozoids, began to develop into new plants but stopped after a time and became *seeds* for dispersal. Moreover fertilisation no longer depended on the presence of extraneous water: the necessary liquid was derived from the male spores and from the breakdown of the tissues of the apex of each female sporangium. For, in remembrance of their aquatic origin, the spermatozoids of plants still have to swim for it, like human spermatozoa.

University of Cambridge

Dr. A. D. Gardner, regius professor of medicine in the University of Oxford, has been appointed Rede lecturer for 1953.

Prof. H. R. Dean has been re-elected as representative of the university on the General Medical Council for a further five years.

University of Leeds

The title of emeritus professor has been conferred on Prof. J. W. McLeod, F.R.S., who lately retired from the Brotherton chair of bacteriology.

Mr. P. J. Moir, who held the chair of surgery from 1940 to 1946, and who has been elected dean of the faculty of medicine, has been appointed professor of surgery from Oct. 1. For the time being Prof. Digby Chamberlain will continue to act as head of the department of surgery.

Royal College of Physicians of London

Prof. Alan Moncrieff will deliver the Charles West lecture on Tuesday, Nov. 11, at 5 P.M. at the college, Pall Mall East, S.W.1. His subject will be Infection in the Newborn Baby.

Royal College of Surgeons of Edinburgh

At a meeting held on Oct. 22 the following officers were elected:

President, Prof. Walter Mercer; vice-president, Mr. W. Quarry Wood; secretary and treasurer, Mr. J. J. Mason Brown; members of the president's council, Prof. R. C. Alexander, Mr. K. Paterson Brown, Mr. John Bruce, Mr. Arthur Hamilton, Mr. James Jeffrey, Mr. Archibald Brown Kerr, Sir James Learmonth, Mr. Robert Mailer, Dr. David Middleton, Mr. T. McWalter Millar, Dr. Douglas Miller, and Mr. R. Leslie Stewart; representative on the General Medical Council, Sir Henry Wade; conservator of museum, Mr. J. N. Jackson Hartley; convener of museum committee, Mr. John Bruce; librarian, Dr. Douglas Guthrie.

The following were admitted to the fellowship:

Amirali Abdulkarim Alidina, Gurbux Singh Babbar, K. L. Barnes, A. K. Brown, Jitendrarao Vajendrarao Desai, Sami Salim Khoury, Manijah Khudabux, Herbert Kramer, R. C. W. Lowe, J. D. Malloch, Naizby Noble, R. D. Oatway, F. F. Sandor, L. A. Scrivin, Gurmukh Singh Sekhon, Shailendra Kumar Sinha, J. R. Smith, D. M. Stevens, N. P. Stracey, S. E. Wijetilaka.

Royal Australasian College of Physicians

The following have been admitted to the membership:

John Beveridge, R. S. Colton, M. Faunce, Alison K. Garven, Donald F. King, G. S. Nagy, A. Jean Palmer, I. S. Wallman.

Royal Institute of Public Health and Hygiene

On Dec. 9, 10, and 11, at 4.30 P.M., at the institute, 28, Portland Place, London, W.1, Lord Horder will deliver the Harben lectures. He is to speak on Fifty Years of Medicine.

North of England Otolaryngological Society

The following officers have been appointed for 1953: president, Mr. R. R. Simpson; vice-president, Mr. J. M. Wishart; immediate past president, Mr. G. S. Seed; secretary, Mrs. F. Cavanagh; members of council, Mr. R. Thomas, Mr. J. I. Munro Black, Mr. R. S. Venters, and Mr. J. D. Gray.

Mothercraft Exhibition and Conference

This exhibition and conference which opened at the Central Hall, Westminster, S.W.1, on Oct. 30 will continue until Nov. 12.

Royal Society of Arts

Mr. P. W. Brian, SC.D., of Imperial Chemical Industries, will deliver three Cantor lectures on Mondays, Nov. 17, 24, and Dec. 1, at 6 P.M., at the house of the society, John Adam Street, Adelphi, London, W.C.2. He will speak on Microbiology.

First-aid in Mines

A portable first-aid room, which can be moved forward as the coal face advances, is on trial at Markham no. 1 colliery, near Chesterfield. It is 12 ft. long, 6 ft. high, and 6 ft. wide, and contains a cabinet on wheels, for quick transmission, trestles, stretcher, eye-lamp, two chairs, dressing-bin, fresh-water containers, and flasks of tea.

Research into Ageing

The research committee of the International Association of Gerontology consists of an American and a European division. The European division held its meeting at Liège on Sept. 25–27, under the presidency of Prof. L. Brull. The officers of this division are Prof. A. P. Thomson (chairman), Professor Brull, and Dr. V. Korenchevsky (hon. secretary), and those attending from this country included Prof. J. B. Duguid, Prof. Alexander Haddow, Dr. W. H. Lloyd, and Prof. Alexander Kennedy. The committee will hold sessions at the third International Gerontological Congress, which is to be held at Oxford in July, 1954.

Practice Arrangements

At a meeting of London Executive Council on Oct. 23, the general benefits committee reported the case of a practitioner with a list of 3936 health-service patients who is also employed by an industrial company. According to the report, a check had shown that the majority of prescriptions for this practitioner's patients were issued by his assistant. The committee had formed the opinion that the doctor should do at least half of the work of the practice and should attend morning and evening surgeries. The doctor had been given a month to review the position, and had been informed that, if his proposals were unsatisfactory, it might be necessary to ask the medical service committee to investigate the conduct of his practice.

Society of Medical Officers of Health

At the dinner of this society in London on Oct. 23, Mr. Iain Macleod, the Minister of Health, expressed pleasure at being in a gathering "that is almost entirely Scottish." He urged members not to mourn too much the passing of hospitals from their control. He was less happy about the relation of local authorities to the National Health Service; but a solution of this problem might have to await a more rational arrangement of local-authority boundaries—a task that no Government with a small majority would care to undertake. Mr. Macleod had heard that the society was considering a change in its name; and he suggested that "preventive medicine" might be incorporated in the new title. Mr. Macleod then proposed The Society; and in his reply Dr. Andrew Topping, the president, suggested that the achievement of local authorities between the passing of the Local Government Act of 1929 and the start of the National Health Service had not been fully appreciated. He still rued the passing from the M.O.H.'s control of the tuberculosis and infectious-disease hospitals, with their social implications. Dr. Topping also held that general practitioners should have a better status; they could, he thought, work more commonly in hospitals. Dr. C. F. White spoke in kindly terms of The Guests; and Mr. George North, LL.D., and Prof. G. S. Wilson responded.

EMERGENCY BED SERVICE.—In the week ended last Monday, applications for general acute cases numbered 1060. The proportion admitted was 92·4%.

The International Congress of Medicine and Military Pharmacy which was to have been held in Montevideo in March, 1953, will not now take place.

Prof. F. Grundy has been appointed a member of the committee set up by the Minister of Food to inquire into the law and the practice of the slaughter of horses.

Surgeons and technicians from seven countries are now attending a two-week training course at Queen Mary's Hospital, Roehampton, on the manufacture and fitting of artificial limbs and the rehabilitation of amputees. The course is sponsored by the World Veterans Federation and the International Society for the Welfare of Cripples, and the Ministry of Pensions has provided facilities and personnel.

Diary of the Week

NOV. 2 TO 8

Monday, 3rd

SOCIETY OF APOTHECARIES OF LONDON, Black Friars Lane, Queen Victoria Street, E.C.4
3.30 P.M. Mr. T. Holmes Sellors: Surgery of Diseases of the Chest.
5 P.M. Sir Geoffrey Todd: Medical Aspects of Diseases of the Chest.

INSTITUTE OF CHILD HEALTH, The Hospital for Sick Children, Great Ormond Street, W.C.1
5.30 P.M. Prof. N. J. Scorgie, B.SC.: Animal Epidemiology.

ROYAL EYE HOSPITAL, St. George's Circus, Southwark, S.E.1
5 P.M. Prof. Arnold Sorsby: Streptomycin and other Newer Antibiotics.

Tuesday, 4th

BRITISH POSTGRADUATE MEDICAL FEDERATION
5.30 P.M. (London School of Hygiene, Keppel Street, W.C.1.) Sir Bryan Matthews, F.R.S.: Life at High Altitudes.

ROYAL SOCIETY OF MEDICINE, 1, Wimpole Street, W.1
8.30 P.M. *Section of Orthopædics.* Mr. J. G. Bonnin, Mr. E. Mervyn Evans, Mr. J. A. McLaughlan, Mr. R. H. Metcalfe: Fractures in the Aged.

SOCIETY OF APOTHECARIES OF LONDON
3.30 P.M. Sir William Gilliatt: Changes in Obstetrics and Gynæcological Practice in Last Fifty Years.
5 P.M. Dr. Kenneth Harris: Pitfalls in Diagnosis of Coronary Thrombosis.

INSTITUTE OF DERMATOLOGY, St. John's Hospital, Lisle Street, W.C.2
5.30 P.M. Dr. C. O. Carter: Genetics.

WEST END HOSPITAL FOR NERVOUS DISEASES, 73, Welbeck Street, W.1
5.30 P.M. Dr. C. Worster-Drought: Neurological demonstration.

Wednesday, 5th

ROYAL SOCIETY OF MEDICINE
8 P.M. *Section of Surgery.* Mr. R. C. Brock, Prof. C. G. Rob, Mr. Frank Forty: Reconstructive Arterial Surgery.

SOCIETY OF APOTHECARIES OF LONDON
3.30 P.M. Dr. Robert Forbes: Medicolegal Hazards in General Practice.
5 P.M. Dr. R. Hale-White: Present and Future Trends in General Practice.

ROYAL EYE HOSPITAL
5.30 P.M. Mr. L. H. Savin: Differential Diagnosis of Headache.

ROYAL INSTITUTE OF PUBLIC HEALTH AND HYGIENE, 28, Portland Place, W.1
3.30 P.M. Dr. C. H. Andrewes, F.R.S.: Work of World Influenza Centre.

INSTITUTE OF DERMATOLOGY
5.30 P.M. Dr. J. O. Oliver: Epitheliomata.

INSTITUTE OF UROLOGY, St. Paul's Hospital, Endell Street, W.C.2
5 P.M. Mr. H. G. Hanley: Urological Problems during Pregnancy.

SOCIETY OF APOTHECARIES OF LONDON
3.30 P.M. Sir Horace Evans: Medical Aspects of Hypertensive Disease.
5 P.M. Mr. A. Dickson Wright: Surgical Management of Hypertension.

MIDLAND MEDICAL SOCIETY
8.15 P.M. (Birmingham Medical Institute.) Prof. Melville Arnott, Mr. A. L. D'Abreu: Management of Mitral Stenosis.

MANCHESTER MEDICAL SOCIETY
4.30 P.M. (University of Manchester.) *Section of Medicine.* Dr. W. G. Oakley: Diabetes.

MEDICO-CHIRURGICAL SOCIETY OF EDINBURGH
8.30 P.M. (Royal College of Surgeons, 18, Nicolson Street.) Dr. J. K. Slater, Dr. Montague Hadley: Coal Gas Poisoning.

Thursday, 6th

ROYAL COLLEGE OF PHYSICIANS, Pall Mall East, S.W.1
5 P.M. Dr. R. R. Bomford: Changing Concepts of Health and Disease, with particular reference to "Psycho-somatic Medicine." (Bradshaw lecture.)

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
4.30 P.M. Dr. C. F. Hadfield: Random Reminiscences of Fifty Years. (Frederic Hewitt lecture.)

BRITISH POSTGRADUATE MEDICAL FEDERATION
5.30 P.M. Group-Captain W. K. Stewart: Physiological Effects of Gravity.

UNIVERSITY OF LONDON
5 P.M. (1, Wimpole Street, W.1.) Prof. Arthur W. Proetz (St. Louis): Clinical Aspects of Respiratory Air Currents. (Semon lecture.)

ROYAL MEDICO-PSYCHOLOGICAL ASSOCIATION
2.15 P.M. (1, Wimpole Street, London, W.1.) Dr. W. Rees Thomas: The Unwilling Patient. (Maudsley lecture.)

ROYAL EYE HOSPITAL
5.30 P.M. Miss J. M. Dollar: Squint.

INSTITUTE OF DERMATOLOGY
5.30 P.M. Dr. H. Haber: Specific and Foreign Body Granulomas.

ST. GEORGE'S HOSPITAL MEDICAL SCHOOL, Hyde Park Corner, S.W.1
5 P.M. Dr. Denis Williams: Neurological lecture-demonstration.

LIVERPOOL MEDICAL INSTITUTION, 114, Mount Pleasant, Liverpool, 3
8 P.M. Mr. John Hamilton: Avoidable Stillbirths and Neonatal Deaths.

HONYMAN GILLESPIE LECTURE
5 P.M. (University New Buildings, Teviot Place, Edinburgh.) Mr. J. R. Cameron: Melanoma.

UNIVERSITY OF ST. ANDREWS
5 P.M. (Medical School, Small's Wynd, Dundee.) Prof. J. B. Duguid: Cholesterol and Atherosclerosis.

Friday, 7th

ROYAL SOCIETY OF MEDICINE
10.30 A.M. *Section of Otology.* Air Vice-Marshal E. D. D. Dickson: Effects of Intense Sound and Ultra-sound on the Ear. (Presidential address.)
2.30 P.M. *Section of Laryngology.* Mr. J. P. Stewart: Use of Cortisone in Allergic Rhinitis. (Presidential address.)
5.30 P.M. *Section of Anæsthetics.* Dr. M. D. Nosworthy: Aids to Anæsthesia. (Presidential address.)

INSTITUTE OF DERMATOLOGY
5.30 P.M. Dr. H. J. Wallace: Congenital and Developmental Abnormalities.

ROYAL EYE HOSPITAL
5 P.M. Dr. J. Blewett: Diagnostic Value of X rays in Ophthalmic Work.

Saturday, 8th

INSTITUTE OF LARYNGOLOGY AND OTOLOGY, 330, Gray's Inn Road, W.C.1
11.30 A.M. Dr. Proetz: Olfaction.

INSTITUTE OF OBSTETRICS AND GYNÆCOLOGY
NOON. (Hammersmith Hospital, Ducane Road, W.12.) Prof. W. I. C. Morris: Uterine Rupture.

Appointments

BOLAND, C. R., M.A., M.D., M.SC. Dubl., F.R.C.S.I.: surgeon, St. Kevin's Hospital, Dublin.

BOVERI, R. M., M.D., L.R.C.P.E.: asst. chest physician, Herefordshire group of hospitals and Herefordshire county council.

KERTESZ, ANDREW, M.B. Lond., D.C.P., D.T.M. & H.: asst. pathologist, General Hospital, Nottingham.

MACCARTHY, H. M., F.R.C.S.I., M.R.C.P.I., F.A.C.S.: surgeon, St. Kevin's Hospital, Dublin.

NORTH, J. F., M.A., M.B. Camb., F.R.C.S.: part-time consultant plastic surgeon, Dudley and Stourbridge group of hospitals.

TILLEY, ROBERT, M.R.C.S., D.P.H.: appointed factory doctor, Hoo district, Kent.

WILLIAMS, A. H., M.R.C.S.: appointed factory doctor, Bargoed district, Glamorganshire.

East Anglian Regional Hospital Board:

ASCROFT, N. O., M.B. Lpool: medical registrar, Foxhall Hospital.
KEYES, MARY, M.B. N.U.I.: medical registrar, Papworth Hospital.
PETTIGREW, R. W., M.B. Edin.: senior registrar in chest medicine, East Norfolk Chest Clinic.

South-East Metropolitan Regional Hospital Board:

ELWELL, H. V. W., M.A. Camb., L.R.C.P., D.P.M.: asst. psychiatrist, Hailsham group of hospitals.
GOLEBIOWSKI, A. K., MED. DIP. Lwow: asst. chest physician, Preston Hall group of hospitals.
MESTER, A. J., M.D. Cracow: asst. physician (geriatrics), Greenwich and Deptford group of hospitals.
ORCHARD, N. P., M.D. Lond.: consultant pathologist, Dartford group of hospitals.
WILSON, K. L., M.A. Camb., F.R.C.S., D.L.O.: consultant E.N.T. surgeon, Greenwich, Deptford, Woolwich and Lewisham group of hospitals.

Colonial Service:

BLAND, R. H., M.D. Dubl., M.R.C.P.I.: D.M.S., eastern region, Nigeria.
BOOKLESS, D. W., M.B. Edin.: M.O., Fiji.
CARROLL, D. S., M.R.C.S.: M.O., Barbados.
CHISWELL, D. A., L.R.C.P.: resident M.O. (interne), Kenya.
FLETCHER, G. H., M.B. Lpool: M.O. (Silicosis Bureau), Northern Rhodesia.
GOLIGHTLY, D. L., M.B. Durh.: M.O., Northern Rhodesia.
HARBEN, E. F., M.B. Madras: M.O., British Honduras.
IRWIN, D. B., M.D. Lond., M.R.C.P.: physician specialist, General Hospital, Barbados.
JAMES, S. T., M.B. Wales: M.O., Federation of Malaya.
JOLLY, T. G., M.B. Belf.: M.O., Fiji.
JONES, S. H. O., M.B. Manc., D.T.M. & H.: D.M.S., Gambia.
KNIGHT, ELLEN, M.R.C.S.: M.O., Tanganyika.
MAYCOCK, HELEN, M.R.C.S., D.C.P.: pathologist, Federation of Malaya.
PRAG, I. I., M.B., D.P.H.: M.O., Jamaica.
REES, W. H., M.R.C.S.: M.O., Fiji.
TARR, L. H., M.B.: M.O., Federation of Malaya.
TERRELL, J. D., M.B. Glasg.: M.O., Federation of Malaya.

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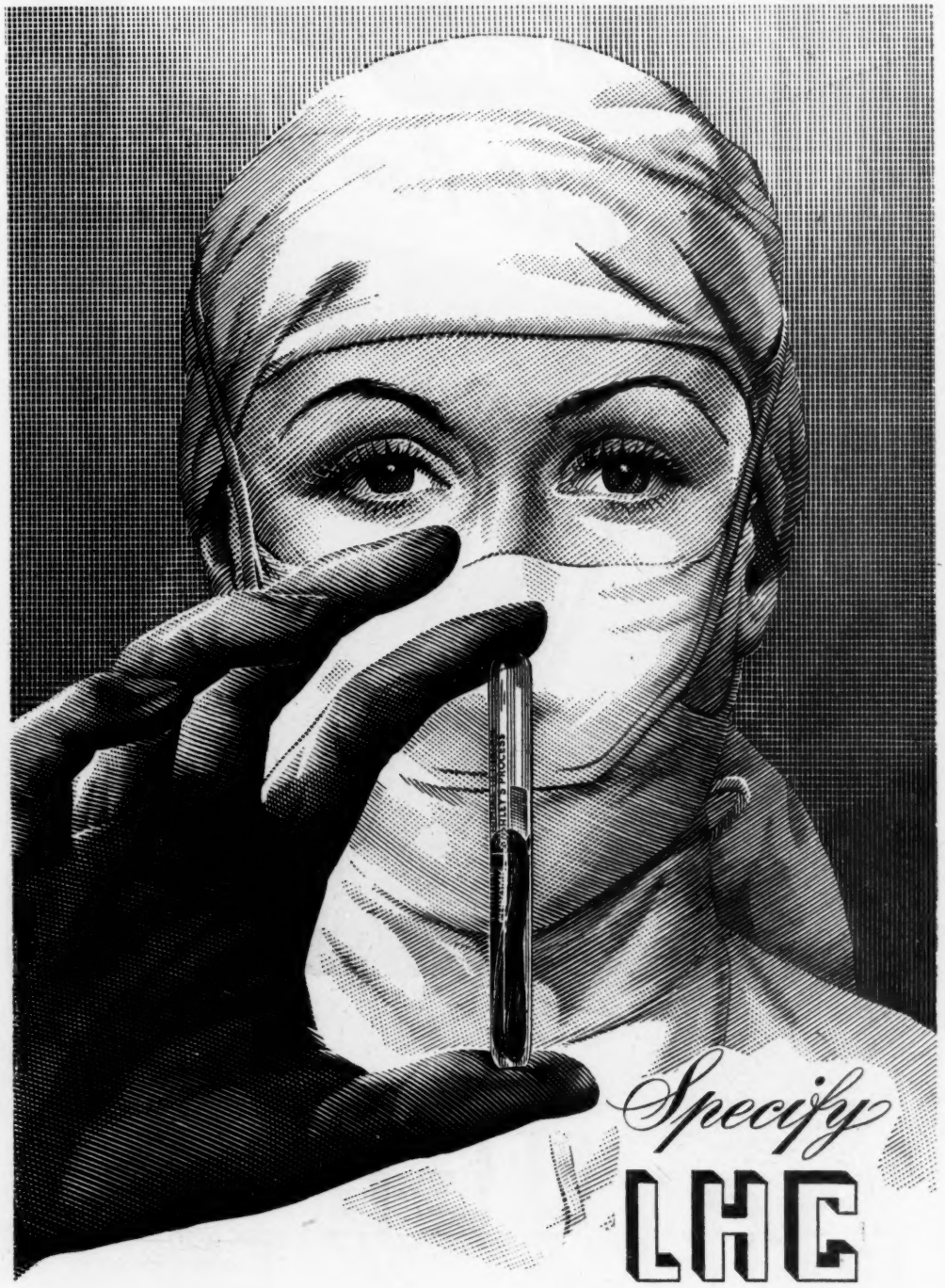

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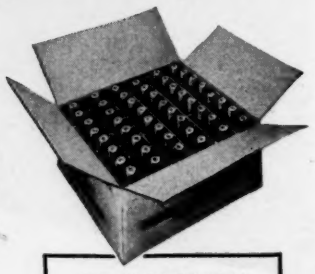

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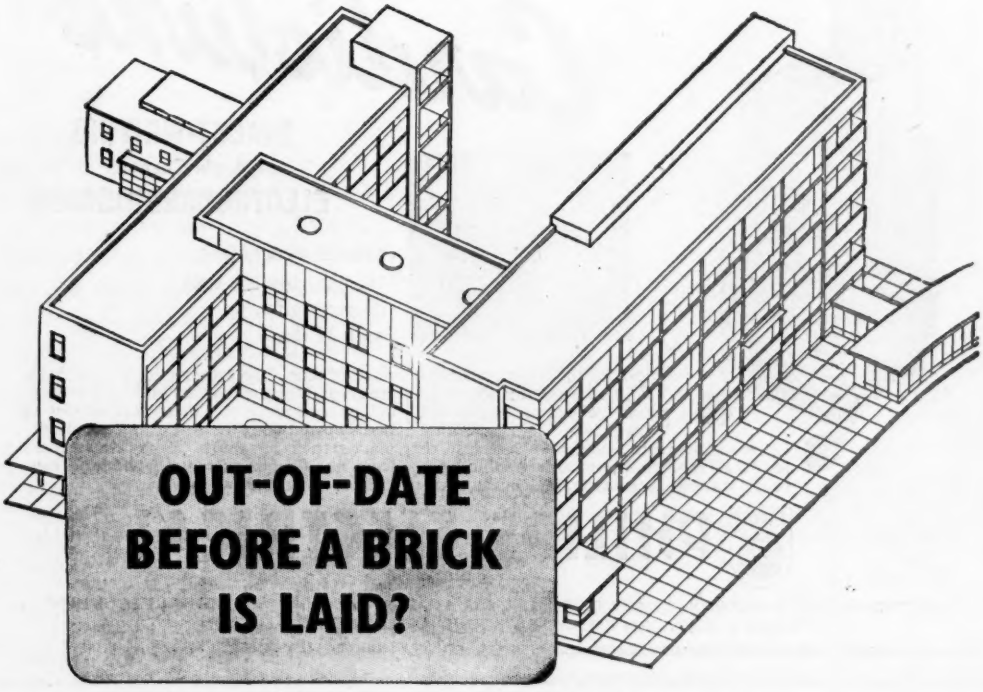

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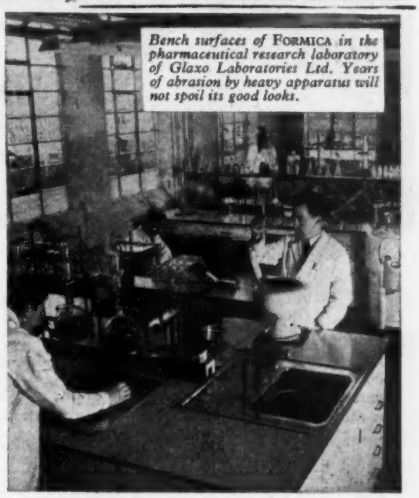

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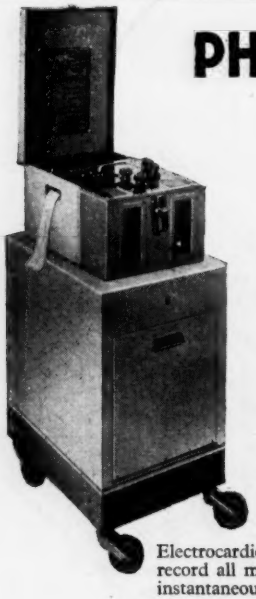

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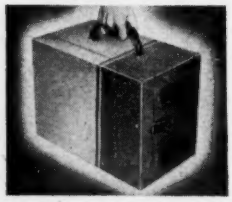

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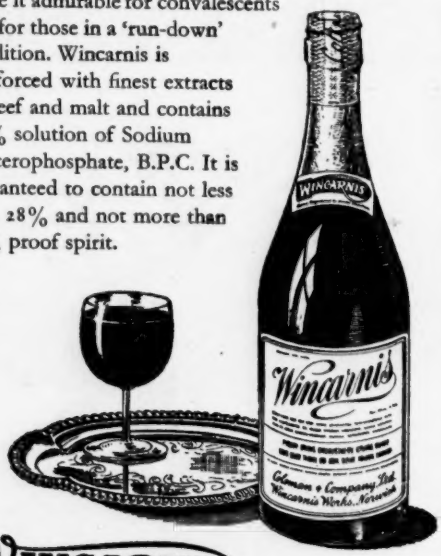

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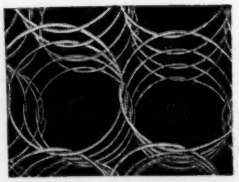

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PRESIDENT: THE EARL SPENCER

MEDICAL SUPERINTENDENT: THOMAS TENNENT, M.D., F.R.C.P., D.P.H., D.P.M.

This Registered Hospital is situated in 130 acres of park and pleasure grounds. Voluntary patients, who are suffering from incipient mental disorders or who wish to prevent recurrent attacks of mental trouble; temporary patients, and certified patients of both sexes are received for treatment. Careful clinical, biochemical, bacteriological, and pathological examinations. Private rooms with special nurses, male or female, in the Hospital or in one of the numerous villas in the grounds of the various branches can be provided.

WANTAGE HOUSE

This is a Reception Hospital in detached grounds with a separate entrance, to which patients can be admitted. It is equipped with all the apparatus for the complete investigation and treatment of Mental and Nervous Disorders by the most modern methods: insulin treatment is available for suitable cases. It contains special departments for hydrotherapy by various methods, including Turkish and Russian baths, the prolonged immersion bath, Vichy Douche, Scotch Douche, Electrical baths, Plombières treatment, etc. There is an Operating Theatre, a Dental Surgery, an X-ray Room, an Ultraviolet Apparatus, and a Department for Diathermy and High-frequency treatment. It also contains Laboratories for biochemical, bacteriological, and pathological research. Psychotherapeutic treatment is employed when indicated.

MOULTON PARK

Two miles from the Main Hospital there are several branch establishments and villas situated in a park and farm of 650 acres. Milk, meat, fruit, and vegetables are supplied to the Hospital from the farm, gardens, and orchards of Moulton Park. Occupational therapy is a feature of this branch, and patients are given every facility for occupying themselves in farming, gardening, and fruit growing.

BRYN-Y-NEUADD HALL

The seaside house of St. Andrew's Hospital is beautifully situated in a park of 330 acres, at Llanfairfechan, amidst the finest scenery in North Wales. On the North-West side of the Estate a mile of sea coast forms the boundary. Patients may visit this branch for a short seaside change or for longer periods. The Hospital has its own private bathing house on the seashore. There is trout-fishing in the park.

At all the branches of the Hospital there are cricket grounds, football and hockey grounds, lawn tennis courts (grass and hard courts), croquet grounds, golf courses, and bowling greens. Ladies and gentlemen have their own gardens, and facilities are provided for handicrafts, such as carpentry, etc.

For terms and further particulars apply to the Medical Superintendent (TELEPHONE: Northampton 4354 (3 lines)), who can be seen in London by appointment.

CHEADLE ROYAL

CHEADLE CHESHIRE

A Registered Hospital for MENTAL DISEASES and its Seaside Branch, GLAN-Y-DON, Colwyn Bay, N. Wales

The object of this Hospital is to provide the most efficient means for the treatment and care of patients of both sexes suffering from MENTAL and NERVOUS DISEASES. The Hospital is governed by a Committee appointed by Trustees. Deep and Modified Insulin Coma; E.C.T., and Psychotherapeutic treatment given. VOLUNTARY, TEMPORARY, AND CERTIFIED PATIENTS RECEIVED.

For Terms and further information apply to the MEDICAL SUPERINTENDENT *Telephone*: GATLEY 2231

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For the early treatment of nervous disorders and patients needing rest and care

A well-appointed House with spacious balconies and extensive views of the South Devon Coast. Beautiful garden and own dairy in 35 acres. In the same grounds, ROWDENS, a comfortable house with lovely views. Private road to the beach.

There is also a charming house, EBWORTHY, MANATON, DARTMOOR, situated in 25 acres, 1100 ft. up for bracing moorland air

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No Branch Establishments Established 1853

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Special provision for Invalids. Milk from own Farm. Two passenger Elevators. Electric Light. Night attendance. Rooms well ventilated and all Bedrooms warmed throughout the Establishment. Large Winter Garden. Extensive Pleasure Grounds. Matlock Golf Links, 18 holes, within easy distance. A large staff of Male and Female Attendants, Masseurs, and Bath Attendants.

The Baths constitute a wing of the Hydro and access is by lift from all floors without stairs.

Admission may be arranged through the Consulting Physician, from whom any further information required is available.

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Telegrams: "Smedleys Matlock" *Telephone:* Matlock 17 (5 lines)

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PRIVATE MENTAL HOME for Nervous and Mental illness. All types of treatment carried out. Accommodation for Alcoholics and Addicts available. Special Geriatric Unit now open. Fees from 6 gns. per week upwards according to requirements.

Apply to Dr. J. A. SMALL Telephone: Norwich 20080

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A Private Home for the Treatment and Care of Mental and Nervous Illnesses in both Sexes.

A modern house, 12 miles from Marble Arch, in attractive secluded grounds. Patients treated under Certificate, Temporary or Voluntary status. Modern forms of treatment, including psychotherapy, narco-analysis, modified insulin, occupational therapy, E.C.T., etc. Fees from 12 guineas a week.

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On the Cotswold Hills, seven miles from Cheltenham, Stroud and Gloucester, equipped for the treatment of Pulmonary Tuberculosis. Full day and night nursing staff.

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Full particulars from Secretary, COTSWOLD SANATORIUM, CRANHAM, GLOUCESTERSHIRE.

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Academic and Educational

ROYAL COLLEGE OF PHYSICIANS OF LONDON

RICHARD RAYMOND BOMFORD, D.M., F.R.C.P., will deliver the BRADSHAW LECTURE on THURSDAY, 6TH NOVEMBER, 1952, at 5 P.M. at the College, Pall Mall East, S.W.1.

Subject: "Changing concepts of health and disease, with particular reference to 'Psychosomatic Medicine.'"

Any member of the Medical Profession admitted on presentation of card.

By order of the President.
HAROLD BOLDERO, Registrar.

UNIVERSITY OF LONDON

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10-WEEK COURSE FOR THE FINAL F.R.C.S.
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The course will comprise :—
Systematic lectures to cover the field of general surgery and of the specialties.
Clinical demonstrations and bedside instruction.
Clinical methods and the physical examination of patients.
Practical tuition in surgical pathology, anatomy and operative surgery.
Experience in examination technique.

In addition there will be clinico-pathological demonstrations and a few conducted visits to other special hospitals.

Fee : 40 guineas. The class will be limited to 20.

Applications, with academic and clinical record, to reach the Dean, Postgraduate Medical School, Ducane-road, London, W.12, by 30th November, 1952.

UNIVERSITY OF LONDON

The HEATH CLARK LECTURES entitled "Landmarks in the History of Hygiene" will be delivered by Dr. H. E. SIGERIST at 5.15 P.M. on 10TH, 11TH, 12TH, 13TH and 14TH NOVEMBER at the London School of Hygiene and Tropical Medicine, Keppel-street, Gower-street, W.C.1.

Admission free, without ticket.

JAMES HENDERSON, Academic Registrar.

UNIVERSITY OF LONDON

GRANTS FOR RESEARCH

Applications are invited from members* of the University for grants from the Central Research Fund to assist specific projects of research and for the provision of special materials and apparatus. Grants are not made for normal maintenance.

Applications must next be received not later than 30th November, 1952. Forms of application and further particulars may be obtained from the Secretary to the Central Research Funds Committee, University of London, Senate House, London, W.C.1.

*Members of the University are defined by Statute as the Chancellor, the members for the time being of the Court and of the Senate respectively, the Professors and Readers, and other Teachers of the University during their tenure of office, the graduates and the students.

EDINBURGH POST-GRADUATE BOARD FOR MEDICINE

GENERAL SURGERY

3-month courses of Postgraduate Surgery are arranged to start on 23RD MARCH and 28TH SEPTEMBER, 1953. These are suitable for surgeons requiring refresher courses in the current outlook on general surgery, or for graduates preparing to specialise in surgery ; approximately 275 hours of instruction are provided. Fee £31 10s.

INTERNAL MEDICINE

Courses lasting 12 weeks, suitable for graduates wishing a refresher course, or to specialise in Medicine, begin on 30TH MARCH and 28TH SEPTEMBER, 1953. These courses consist of 320 hours instruction, comprising lectures, clinical demonstrations, and ward visits. Fee £31 10s.

Additional instruction in Clinical Pædiatrics is arranged in conjunction with the course in Medicine, for which there is a small fee ; the numbers are limited.

Applications for enrolment should be addressed to Director of Postgraduate Studies, Surgeons' Hall, Edinburgh, 8, supplying particulars of qualifications and postgraduate experience.

EMPIRE RHEUMATISM COUNCIL

The AUTUMN WEEKEND COURSE will be held at The Arthur Stanley Institute, Middlesex Hospital, Peto-place, Marylebone-road, N.W.1 (Great Portland-street and Regent's Park Underground Stations), on FRIDAY and SATURDAY, 21ST and 22ND NOVEMBER, 1952.

LECTURE-DEMONSTRATIONS

Friday, 21st November
4.30 P.M. Problems in the Diagnosis of the Rheumatic Disorders — Prof. R. E. TUNBRIDGE, O.B.E., F.R.C.P.
5.30 P.M. Gout — G. D. KERSLEY, F.R.C.P.

Saturday, 22nd November
10.15 A.M. Physical Methods in the Treatment of the Rheumatic Disorders — A. C. BOYLE, M.R.C.P.
11.30 A.M. Orthopædic Aspects of the Rheumatic Diseases — NORMAN CAPENER, F.R.C.S.
2 P.M. Pathology of the Rheumatic Diseases — H. J. GIBSON, M.D.
3 P.M. Rheumatoid Arthritis — F. DUDLEY HART, F.R.C.P.
4 P.M. Tea
4.15 P.M. Ankylosing Spondylitis — H. F. WEST, M.R.C.P.

The fee for the course will be 2 guineas, limited to 60 entries, to be received with remittance, at least 1 week before by the General Secretary, Empire Rheumatism Council, Tavistock House (N), Tavistock-square, W.C.1.

UNIVERSITY COLLEGE HOSPITAL MEDICAL SCHOOL. OBSTETRIC UNIT. Applications are invited for the post of FIRST ASSISTANT in the Obstetric Unit. Salary according to qualifications but not less than £1250 p.a. with Superannuation and Family Allowance. Applicants must possess a University Degree and the M.R.C.O.G. The holder of the post will be required to sign an Honorary Contract to undertake duties in University College Hospital.

Applications, with names of 2 referees, should be sent to the Secretary of University College Hospital Medical School, University-street, London, W.C.1, not later than 14 days from the date of the appearance of this advertisement.

ST. MARY'S HOSPITAL MEDICAL SCHOOL (University OF LONDON), Paddington, W.2. Applications are invited for a RESEARCH ASSISTANT in the Pædiatric Unit to take part in physiological research on the respiration of the new born infant. The appointment will be for 1 year and may be renewable for a second year. Salary £800.

Applications, together with the names of 2 referees, should reach the Secretary by 15th November, 1952.

UNIVERSITY OF BIRMINGHAM. Faculty of Medicine—RESEARCH. Medically qualified ASSISTANT required in Department of Child Health and Department of Pharmacology for collaborative work on cœliac disease and related conditions. Pædiatric experience essential ; some biochemical training desirable. Salary up to £1000 p.a., according to qualifications and experience.

Applications to Assistant Registrar, Medical School, Birmingham, 15, by 15th November.

THE UNIVERSITY OF MANCHESTER. Applications for the post of LECTURER in the Department of Occupational Health are invited from registered medical practitioners. Candidates should have had good clinical experience and should be able to undertake research. Duties will include practical work in the field. Salary not less than £1500 p.a., with membership of the F.S.S.U. and Children's Allowance Scheme.

Applications should be sent not later than 15th November, 1952, to the Registrar, the University, Manchester, 13, from whom further particulars and forms of application may be obtained.

THE UNIVERSITY OF MANCHESTER. There is a vacancy for an experienced SENIOR HISTOLOGICAL TECHNICIAN in the Department of Pathology. The post is a responsible one, and applicants must be Associates or Fellows of the Institute of Medical Laboratory Technology. The successful candidate will be required to act as Deputy Supervisor of technical staff in the Department. Salary according to age and experience, with membership of a Superannuation Scheme and children's allowances.

Applications should be sent to—
Professor A. C. P. CAMPBELL, The Department of Pathology, York-place, Manchester, 13.

UNIVERSITY OF BELFAST. Applications are invited for the following posts in the School of Dentistry :—
(1) LECTURESHIP IN DENTAL SURGERY.
(2) LECTURESHIP IN DENTAL PROSTHETICS AND MECHANICS.
(3) LECTURESHIP IN OPERATIVE DENTAL SURGERY.

Salary £1300–£50–£1750, plus provision for superannuation. In certain conditions the salary may rise to £2000. Initial placing on the scale will depend on experience and qualifications.

Applications should be submitted by 30th January, 1953. Particulars from G. R. COWIE, M.A., LL.B., Secretary.

UNIVERSITY COLLEGE OF THE WEST INDIES. Applications are invited for the post of SENIOR LECTURER IN OBSTETRICS AND GYNÆCOLOGY. The duties will include clinical work in the University College Hospital and instruction of students working for the medical degrees of the University of London. The salary scale is £1200–£50–£1600 p.a. The point of entry in the scale is determined by qualifications and experience. Child allowance paid and also temporary cost-of-living allowance. Superannuation under F.S.S.U. arrangements. Unfurnished accommodation is available at 5% of basic salary. The successful applicant will be expected to take up the post during March, 1953.

Applications (12 copies), giving full particulars of qualifications, and the names of 3 referees, should be received before 22nd November, 1952, by the Secretary, Senate Committee on Higher Education in the Colonies, Senate House, University of London, London, W.C.1, from whom further particulars may be obtained.

Hospital Services : Senior Appointments

(See Note under Appointments, p. 894 of Text.)

GUY'S HOSPITAL, S.E.1. The Board of Governors of Guy's Hospital invites applications for the appointment of a CONSULTANT RADIOLOGIST, whole-time or maximum part-time. The duties include Radiological work in the Medical, Surgical and Dental Departments. The remuneration for the appointment will be in accordance with the Ministry of Health's rates for Consultants.

Applications (10 copies), together with the names of 3 referees should be sent to the Superintendent, Guy's Hospital, London Bridge, S.E.1, not later than 14th November, 1952. Canvassing of members of the Board or of the Advisory Appointments Committee will disqualify.

ROYAL FREE HOSPITAL GROUP. Applications are invited from registered medical practitioners for the appointment of FIRST ASSISTANT to the Radiotherapy Department. Applicants must hold a suitable radiological diploma and should have had subsequent experience in radiotherapy. The appointment is whole-time and in the salary scale £1300–£50–£1750. Duties to commence on 1st February, 1953.

Formal application, together with the names of 3 referees, should be made to the Secretary of the Board of Governors, The Royal Free Hospital, Gray's Inn-road, London, W.C.1, from whom further particulars may be obtained, not later than 29th November, 1952.

ROYAL MASONIC HOSPITAL, Ravenscourt Park, London, W.6. Applications are invited from Fellows of one of the Royal Colleges of Surgeons for the appointment of CONSULTANT SURGEON at the above Hospital as from 1st April, 1953. Candidates must be engaged in consulting practice and well established in their profession.

Applications, giving detailed information and the names and addresses of 3 referees, should reach the undersigned (from whom further information may be obtained) on or before 30th November, 1952.

R. E. LAWSON, Secretary and House Governor.

SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of a Whole-time ASSISTANT PSYCHIATRIST to work under the general supervision of a Consultant Psychiatrist in the Observation Wards of Fulham Hospital, W.6. Salary scale £1300–£50–£1750 p.a. Candidates should possess the D.P.M.

Applications (5 copies), stating date of birth, qualifications, experience, and present appointment(s), and giving the names and addresses of 3 referees, should be made by letter and sent to the Secretary (S.1.), South West Metropolitan Regional Hospital Board, 11A, Portland-place, London, W.1, to arrive not later than 22nd November, 1952. Applicants may visit the Hospital by local arrangement.

Provincial

BIRMINGHAM REGIONAL HOSPITAL BOARD. Applications invited for appointment of Whole-time CONSULTANT in Radiotherapy, Wolverhampton and Stoke-on-Trent Groups. Candidates must possess Diploma in Radiotherapy, and possession of higher qualification an advantage. Wide experience in radiotherapy essential.

Applications (15 copies), stating name, age, nationality, qualifications, present and previous appointments, and details of 3 referees, to Secretary, 10, Augustus-road, Birmingham, 15, before 17th November, 1952.

EAST ANGLIAN REGIONAL HOSPITAL BOARD. ASSISTANT DENTAL SURGEON (whole-time) in the Norwich Area. Main hospitals: Norfolk and Norwich Hospital (440 Beds); West Norwich Hospital, Norwich (285 Beds); Gt. Yarmouth and Gorleston Hospital (120 Beds); St. Andrew's Hospital, Thorpe (1231 Beds); Hellesdon Hospital (865 Beds); Little Plumstead M.D. Colony (505 Beds). Main hospitals only are stated but duties may include work at other hospitals or clinics in the Area. Salary on Senior Hospital Dental Officer scale.

Applications (8 copies), stating age, qualifications, and details of present and previous appointments, together with the names of 3 referees, to Secretary of Board, 117, Chesterton-road, Cambridge, by 28th November, 1952. Candidates invited to visit the hospitals by direct arrangement with the Hospital Management Committee Secretary, Norfolk and Norwich Hospital.

EXETER CLINICAL AREA. South-Western Regional HOSPITAL BOARD. Applications are invited from registered medical practitioners for the appointment of ASSISTANT RADIOTHERAPIST in the Exeter Clinical Area. The appointment will be on a whole-time basis in the Senior Hospital Medical Officer grade. Applicants should have had previous experience in radiotherapy. The successful candidate will be required to work under the general direction of the Consultant Radiotherapist mainly at the Royal Devon and Exeter Hospital, Exeter, but may be required to work at other hospitals in the Clinical Area as may be determined by the Regional Board from time to time. Opportunities for experience in radioactive isotope work will be available.

Applications (12 copies), stating date of birth, qualifications, and experience, together with 12 copies of 2 testimonials, and the names and addresses of 2 referees, should reach the Secretary of the Regional Hospital Board, 27, Tyndalls Park-road, Bristol, 8, not later than 15th November, 1952.

LIVERPOOL REGIONAL HOSPITAL BOARD. Applications are invited for the post of ASSISTANT ANÆSTHETIST either whole-time or on maximum part-time sessions, with duties mainly in the South Liverpool and St. Helens areas. Salary £1300 (at age 32)–£50–£1750, proportionate in the case of a part-time appointment. Applicants should possess the D.A. and have had considerable experience in the administration of anæsthetics.

Forms of application from, and to be returned to, Dr. T. Lloyd Hughes, Senior Administrative Medical Officer, Liverpool Regional Hospital Board, 19, James-street, Liverpool, 2, to be received not later than 22nd November, 1952.

VINCENT COLLINGE, Secretary to the Board.

LIVERPOOL REGIONAL HOSPITAL BOARD. North LIVERPOOL AREA. Applications are invited for the post of Whole-time ASSISTANT ANÆSTHETIST with duties mainly at Walton Hospital. Applicants should possess the D.A. and have had considerable experience in the administration of anæsthetics. Salary £1300 (at age 32)–£50–£1750.

Forms of application from, and to be returned to, Dr. T. Lloyd Hughes, Senior Administrative Medical Officer, Liverpool Regional Hospital Board, 19, James-street, Liverpool, 2, to be received not later than 22nd November, 1952.

VINCENT COLLINGE, Secretary to the Board.

MANCHESTER REGIONAL HOSPITAL BOARD invite applications for the whole-time non-resident post of ASSISTANT ANÆSTHETIST working under the general direction of Consultants at the South Manchester Hospital Centre (Withington, Baguley—Regional Thoracic Surgery Centre—Christie Hospitals, &c.). Salary £1300–£50–£1750. The successful candidate will be required to live in or near Manchester.

Application forms may be obtained from the Senior Administrative Medical Officer to the Board at Cheetwood-road, Manchester, 8, and should be returned to be received not later than 10th November, 1952.

MANCHESTER REGIONAL HOSPITAL BOARD invite applications for the part-time post of CONSULTANT GROUP ANÆSTHETIST (9 half-days weekly) to the Lancaster and Kendal hospitals (Royal Lancaster Infirmary, Queen Victoria Hospital, Morecambe, and Westmorland County Hospital, Kendal, &c.), and at Lancaster Moor Hospital. Wide experience and D.A. essential. Successful candidate will be required to live in or near Lancaster.

Application forms may be obtained from the Senior Administrative Medical Officer to the Board, Cheetwood-road, Manchester, 8, and should be returned to be received not later than 15th November, 1952.

MANCHESTER REGIONAL HOSPITAL BOARD invite applications for the whole-time post of TUBERCULOSIS PHYSICIAN in the Oldham and Ashton Hospital Areas to work under the general guidance of a Consultant. Previous experience of thoracic medicine and tuberculosis essential. Salary £1300–£50–£1750. The appointment may be made in conjunction with the Local Health Authorities concerned, for whom the appointee will carry out duties in connection with prevention, care and aftercare.

Forms of application may be obtained from the Senior Administrative Medical Officer to the Board at Cheetwood-road, Manchester, 8, and should be returned to be received not later than 10th November, 1952.

MANCHESTER REGIONAL HOSPITAL BOARD invite applications for the whole-time non-resident post of ASSISTANT PHYSICIAN in Geriatrics to the department at Withington Hospital, Manchester, and associated Units. Salary £1300–£50–£1750 p.a. Good experience in general medicine and the care of the chronic sick desirable.

Application forms may be obtained from the Senior Administrative Medical Officer to the Board, Cheetwood-road, Manchester, 8, and should be returned, together with the names and addresses of 3 referees, by 15th November, 1952.

NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Whole-time ASSISTANT PSYCHIATRIST required at St. Bernard's Hospital, Southall, Middlesex (2421 Beds). Salary scale £1300–£1750. Considerable experience in the diagnosis and treatment of mental illness essential and possession of relevant higher medical qualification desirable. Appointments normally made from candidates over 32 years, but applications from candidates under that age considered. Hospital may be visited by direct appointment.

Detailed applications, including date of birth and names of 3 referees, to Secretary, North West Metropolitan Regional Hospital Board, 11A, Portland-place, W.1, by 29th November, 1952.

NEWCASTLE REGIONAL HOSPITAL BOARD. Tees-SIDE AND CLEVELAND HOSPITAL MANAGEMENT COMMITTEE GROUPS. Main hospitals—Middlesbrough General, 350 Beds; North Ormesby, 196 Beds; Stockton and Thornaby, 135 Beds; CONSULTANT ORTHOPÆDIC SURGEON, whole-time, or part-time for a minimum of 9 notional half-days per week. The Orthopædic Surgeon appointed must be prepared to work also at the Friarage Hospital, Northallerton (270 Beds), if required. Salary scale £1700–£2750 whole-time, pro rata part-time.

Applications, together with names and addresses of referees (preferably), or testimonials to a total of 3, to be sent to the Senior Administrative Medical Officer, "Blythswood South," Osborne-road, Newcastle upon Tyne, 2, within 28 days.

NEWCASTLE REGIONAL HOSPITAL BOARD. Director of Physical Medicine, Durham and North West Durham Groups of Hospitals. Locum Tenens Consultant appointment tenable to 31st April, 1953. Candidates must have had considerable experience in the organisation and running of a large Physiotherapy Service, and must possess the Diploma of Physical Medicine. Salary 45 guineas per week.

Further particulars may be obtained from the Senior Administrative Medical Officer, "Blythswood South," Osborne-road, Newcastle upon Tyne, 2, to whom applications should be sent, together with names and addresses of 2 referees, within 14 days.

WELSH REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of a Whole-time CONSULTANT PATHOLOGIST to serve the Merthyr and Aberdare Hospital Management Committee Area. The successful candidate will be based at St. Tydfil's Hospital, Merthyr. Candidates should have had wide experience in all branches of pathology and possess a higher qualification in medicine or pathology. The successful candidate will be expected to reside within the Area.

Applications (12 copies), stating date of birth, giving a summary of qualifications, experience, previous appointments with dates, and publications, with names of 3 referees, should be addressed to the Senior Administrative Medical Officer, Welsh Regional Hospital Board, Cathays Park, Cardiff, within 21 days of appearance of this advertisement.

WELSH REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of ASSISTANT RADIOLOGIST (Consultant status) to serve the Wrexham, Powys, and Mawddach Hospital Management Committee. The successful candidate will be based at the 2 main Wrexham Hospitals (550 and 170 Beds respectively) and will also be expected to serve other hospitals in the Group. Candidates must hold the Diploma of Medical Radiology (Diagnostic). The successful candidate will be asked to state whether he wishes to hold a whole-time or maximum part-time appointment.

Applications (12 copies), stating date of birth, giving a summary of qualifications, experience, previous appointments with dates, and publications, together with the names of 3 referees, should be addressed to the Senior Administrative Medical Officer, Welsh Regional Hospital Board, Cathays Park, Cardiff, within 21 days of appearance of this advertisement.

WELSH REGIONAL HOSPITAL BOARD. Applications are invited for the appointments of 2 CONSULTANT RADIOLOGISTS to serve the Newport and East Monmouthshire and North Monmouthshire Hospital Management Committees. The successful candidates will be based at the Royal Gwent Hospital, Newport (259 Beds), and will be expected to serve other hospitals in the Groups. Candidates must hold the Diploma of Medical Radiology (Diagnostic). The successful candidates will be asked to state whether they wish to hold a whole-time or maximum part-time appointment.

Applications (12 copies), stating date of birth, giving a summary of qualifications, experience, previous appointments with dates, and publications, together with the names of 3 referees, should be addressed to the Senior Administrative Medical Officer, Welsh Regional Hospital Board, Cathays Park, Cardiff, within 21 days of appearance of this advertisement.

OXFORD REGIONAL HOSPITAL BOARD. Applications are invited from registered medical practitioners for the post of ASSISTANT PSYCHIATRIST to the General and Mental Hospitals of the Aylesbury Area with duties mainly in St. John's (Mental) Hospital, Stone. Candidates should hold the D.P.M. or its equivalent and a higher medical qualification is desirable. Successful candidate will have the option of whole-time or maximum part-time appointment. Married accommodation is available. Candidates are invited to visit St. John's Hospital by arrangement with the Physician-Superintendent from whom further details may be obtained.

Applications (8 copies), stating age, experience, and the names and addresses of 3 referees, should reach the Secretary of the Board, 43, Banbury-road, Oxford, by 21st November.

OXFORD REGIONAL HOSPITAL BOARD. Applications are invited for the post of PHYSICIAN SUPERINTENDENT (Consultant) at St. Crispin Hospital, Northampton. Applicants must hold the D.P.M. or its equivalent and have had wide experience in psychiatry. A higher qualification is desirable. The post will be whole-time or maximum part-time at the option of the selected candidate. A house is available. The post will include duties in psychiatry in the general hospitals of the Northampton/Kettering Area.

Applications (8 copies), stating age, and the names and addresses of 3 referees, should reach the Secretary of the Board, 43, Banbury-road, Oxford, by 21st November. Applicants are invited to visit St. Crispin Hospital by arrangement with the Secretary of the Hospital.

SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of a Part-time CONSULTANT SURGEON (3 half-days per week) at Queen Mary's Hospital for Children, Carshalton, Surrey. Candidates should have special interest in children.

Applications (5 copies), stating date of birth, qualifications, experience, and present appointment(s), and giving the names and addresses of 3 referees, should be made by letter and sent to the Secretary (S.1.), South West Metropolitan Regional Hospital Board, 11A, Portland-place, London, W.1, to arrive not later than 22nd November, 1952. Applicants may visit the Hospital by local arrangement.

SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of a Part-time CONSULTANT PÆDIATRICIAN (2 half-days per week) at Queen Mary's Hospital for Children, Carshalton, Surrey. Candidates should have special interest and experience in rheumatism.

Applications (5 copies), stating date of birth, qualifications, experience, and present appointment(s), and giving the names and addresses of 3 referees, should be made by letter and sent to the Secretary (S.1.), South West Metropolitan Regional Hospital Board, 11A, Portland-place, London, W.1, to arrive not later than 22nd November, 1952. Applicants may visit the Hospital by local arrangement.

SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of Part-time CONSULTANT OBSTETRICIAN AND GYNÆCOLOGIST (9 half-days per week) at the Winchester Group of hospitals. Duties mainly at the Royal Hampshire County Hospital, Winchester. Residence in the Winchester Area will be a condition of appointment.

Applications (5 copies), stating date of birth, qualifications, experience, and present appointment(s), and giving the names and addresses of 3 referees, should be made by letter and sent to the Secretary (S.1.), South West Metropolitan Regional Hospital Board, 11A, Portland-place, London, W.1, to arrive not later than 22nd November, 1952. Applicants may visit the Hospital by local arrangement.

NEW ZEALAND. AUCKLAND HOSPITAL BOARD. Applications are invited from qualified medical practitioners for the post of Full-time THORACIC SURGEON to the Cardio-surgical and Thoracic Surgical Units, Green Lane Hospital, Auckland, New Zealand. Applicants must possess necessary qualifications for status of "Junior Specialist" as defined in the conditions of appointment. Salary scale £1260–£1560 p.a. by annual increments of £50. Commencing salary within scale according to experience. Accommodation not provided. Fares paid by the Board to appointee subject to certain conditions as set out in Conditions of Appointment, which together with form of application may be obtained from the office of the High Commissioner for New Zealand, 415, Strand, London, where also is available for perusal a copy of the most recent Annual Report on the work carried out in the Unit.

Applications close with the undersigned at the office of the Board, Kitchener-street, Auckland, New Zealand, at NOON on Tuesday, 2nd December, 1952.

R. F. GALBRAITH, Secretary.

NEW ZEALAND. AUCKLAND HOSPITAL BOARD. Applications are invited from those with the necessary qualifications for the status of Junior or Senior Specialist for the position of RADIOLOGIST, Board's Institutions. Applicants must be qualified medical practitioners of the British Commonwealth, and the appointee shall be registered in New Zealand before taking up duty. Salary: Junior Specialist £1260 p.a., rising to £1560 p.a. by annual increments of £50; Senior Specialist £1660 p.a., rising to £1910 p.a. by annual increments of £100, £100, and £50. (Commencing salary within these scales will be in accordance with qualifications and experience in the specialty.) The amounts quoted are in New Zealand currency and are living-out rates. Living accommodation is not provided. Particulars regarding payment by the Board of travelling expenses, are set out in the Conditions of Appointment, which, together with an application form may be obtained from the Office of the High Commissioner for New Zealand, 415, Strand, London, W.C.2.

Applications, addressed to the Secretary, close at the office of the Board, Kitchener-street, Auckland, New Zealand, at NOON on Tuesday, 2nd December, 1952.

R. F. GALBRAITH, Secretary.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. Applications are invited for the post of PATHOLOGIST to the Fife District Laboratory, situated at Cameron Hospital, near Leven, Fife. The laboratory has been newly constructed, and will deal with the laboratory requirements from all hospitals, general practitioners and the Public Health Authorities within the County of Fife. Salary will be on the scale of £1300–£50–£1750 p.a.

Applications (8 copies), together with names of 3 referees from whom confidential reports may be obtained, should be submitted to the Secretary, South-Eastern Regional Hospital Board, Scotland, 11, Drumsheugh-gardens, Edinburgh, 3, within 30 days.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. Applications are invited for the post of OPHTHALMIC SURGEON to the Royal Infirmary of Edinburgh which will be vacant on 1st April, 1953. The appointment, which will be part-time (7 sessions) and of Consultant grade, involves the charge of an Ophthalmic Unit of 32 Beds. The successful applicant will be required to take part in undergraduate and postgraduate teaching and to be available for work in certain peripheral clinics in the South-Eastern Region. The post is superannuable, and the conditions of service in accordance with the regulations.

Applications (14 copies), giving particulars of age, previous experience, and qualifications, together with the names of 3 referees, should be submitted to the Secretary, South-Eastern Regional Hospital Board, Scotland, 11, Drumsheugh-gardens, Edinburgh, 3, within 30 days.

Hospital Services: Junior Appointments

(See Note under Appointments, p. 894 of Text.)

BROOK GENERAL HOSPITAL, Shooters Hill-road, S.E.18. SENIOR HOUSE OFFICER (general medicine). The post will be vacant on 1st December and is tenable for 1 year. 90 acute medical beds. Salary £670 p.a., less £150 p.a. if resident.

Apply to Group Secretary, Memorial Hospital, Woolwich, S.E.18.

BROMPTON HOSPITAL, S.W.3. Applications invited for post of REGISTRAR to the Cardiac Department (whole-time). Appointment is for 1 year with eligibility for reappointment and candidates must hold M.R.C.P. Diploma or M.B. of a University.

Applications, stating age, qualifications with dates, nationality, and appointments held, together with copies of testimonials, by 8th November, to—

KENNETH A. F. MILES, House Governor.

CITY OF LONDON MATERNITY HOSPITAL, Hanley-road, London, N.4. OBSTETRIC HOUSE SURGEON required, vacant 3rd December, 1952. Recognised for M.R.C.O.G.

Applications, with copies of 3 testimonials, to Hospital Secretary by 15th November, 1952.

CONNAUGHT HOSPITAL, Walthamstow, E.17. (118 Beds.) Locum RESIDENT SURGICAL OFFICER (Registrar grade) required from 3rd to 30th November, 1952, inclusive, with possibility of extension. Candidates should hold the Fellowship of 1 of the Royal Colleges.

Applications, with copy testimonials, should be sent immediately to the Secretary, Hospital Management Committee, Forest Group (No. 11), Langthorne-road, E.11.

COLINDALE HOSPITAL, The Hyde, N.W.9. (237 Beds for pulmonary tuberculosis.) NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. SENIOR REGISTRAR in Diseases of the Chest required at above Hospital. The post will normally be held for 2 years and the successful candidate will then be given the opportunity of serving for a further 2 years as a Senior Registrar at Croydon Chest Clinic, Katherine-street, Croydon, if he so desires. Applicants should have good training in general medicine as well as experience in the treatment of tuberculosis and diseases of the chest. Possession of a higher medical qualification desirable. Hospital and Clinic may be visited by direct appointment.

Application forms obtainable from, and returnable to, Group Secretary, Hendon Group Hospital Management Committee, Edgware General Hospital, Edgware, Middlesex, by 11th November, 1952.

DREADNOUGHT SEAMEN'S HOSPITAL, Greenwich, S.E.10. Required on 1st December, Whole-time Locum Tenens ASSISTANT CLINICAL PATHOLOGIST. Salary £1000–£1300 p.a., according to experience.

Applications, stating qualifications, and experience, with names of 3 referees, to be sent to—

F. A. LYON, Group Secretary.

DREADNOUGHT SEAMEN'S HOSPITAL, Greenwich, S.E.10. (General Hospital of 140 Beds.) There will be a vacancy for a HOUSE SURGEON on 8th December.

Applications, stating age, qualifications, and experience, together with the names of 3 referees, should be sent to the undersigned on or before 17th November.

F. A. LYON, Secretary,
Seamen's Hospitals Management Committee.
Dreadnought Seamen's Hospital, Greenwich, S.E.10.

ELIZABETH GARRETT ANDERSON HOSPITAL, Euston-road, N.W.1. (ROYAL FREE HOSPITAL GROUP.) Applications are invited from registered Women medical practitioners for the post of FIRST HOUSE PHYSICIAN for Medicine and Pædiatrics, to become vacant 1st January, 1953. Appointment for 6 months. Salary in accordance with Ministry of Health scale for House Officers.

Applications, with copies of 3 recent testimonials, should be sent to the Secretary, Elizabeth Garrett Anderson Hospital, by 13th November, 1952.

EASTMAN DENTAL HOSPITAL AND INSTITUTE OF DENTAL SURGERY, Gray's Inn-road, W.C.1. Applications are invited for the post of ANÆSTHETIST in the grade of Senior House Officer which will become vacant on 1st December, 1952.

Application forms are obtainable from the Director, to whom they should be returned as soon as possible.

FOREST GATE HOSPITAL, Forest-lane, London, E.7. Applications are invited for the resident post of HOUSE OFFICER (obstetrics), second or third post. The appointment is for 6 months, commencing 1st December, 1952, and is recognised for the training of candidates for D.Obst.R.C.O.G.

Written applications, together with 2 references, should be received by the Group Secretary, West Ham Group Hospital Management Committee, Queen Mary's Hospital, Stratford, London, E.15, not later than 15th November, 1952.

HAMPSTEAD GENERAL HOSPITAL, The Green, N.W.3. (ROYAL FREE GROUP.) Applications are invited from registered medical practitioners (Male and Female) for the post of NON-RESIDENT CASUALTY OFFICER at the Main Hospital at Hampstead, N.W.3, vacant 1st December, tenable for 6 months. Salary in accordance with national scale.

Applications on the prescribed form, with copies of 3 recent testimonials, should be returned by 12th November, 1952, to the Administrative Officer.

HAMPSTEAD GENERAL HOSPITAL, The Green, N.W.3. (ROYAL FREE GROUP.) Applications are invited from registered medical practitioners (Male and Female) for the post of RESIDENT CASUALTY OFFICER (graded as Senior House Officer). Salary £670 p.a. Vacant 17th November, tenable for a period of 6 months at the Main Outpatient Department, Camden Town, N.W.1.

Applications to be made on the prescribed form with copies of 3 recent testimonials, to the Administrative Officer as soon as possible.

HAMPSTEAD GENERAL HOSPITAL, The Green, N.W.3. (ROYAL FREE GROUP.) Applications are invited from registered medical practitioners (Male and Female) for the resident post of HOUSE PHYSICIAN, vacant 17th November, tenable for a period of 6 months. Salary in accordance with national scale.

Applications on the prescribed form, with copies of 3 recent testimonials, to be returned as soon as possible to the Administrative Officer.

HAMMERSMITH HOSPITAL AND POSTGRADUATE MEDICAL SCHOOL, London, W.12. HOUSE PHYSICIAN (pædiatrics), required 1st January. R practitioners not considered.

Applications, stating age, qualifications, experience, copies of 2 recent testimonials, to Secretary, Board of Governors, by 14th November.

HAMMERSMITH HOSPITAL AND POSTGRADUATE MEDICAL SCHOOL, London, W.12. 8 HOUSE PHYSICIANS (general medicine), required (4 from 1st January, 4 from 1st February). R practitioners not considered.

Applications, stating age, qualifications, experience, copies of 2 recent testimonials, to Secretary, Board of Governors, by 14th November.

HAMMERSMITH HOSPITAL AND INSTITUTE OF OBSTETRICS AND GYNÆCOLOGY, London, W.12.

HOUSE OFFICER (obstetrics and gynæcology),

HOUSE OFFICER (gynæcology),

required 1st January, 1953.

Applications, stating age, qualifications, experience, copies of 2 recent testimonials, to Secretary, Board of Governors, by 12th November.

MILLER GENERAL HOSPITAL. (180 Beds.) House PHYSICIAN, vacant approximately 20th November, 1952. 6 months appointment. National salary and conditions.

Applications and testimonials to Secretary, Greenwich and Deptford Hospital Management Committee, St. Alfege's Hospital, Greenwich, S.E.10.

MILE END HOSPITAL. (Obstetric Beds 60; Gynæcological Beds 31.) Applications are invited for a vacancy for a SENIOR HOUSE OFFICER (obstetrics and gynæcology), which will occur on 17th December, 1952. Previous experience in these subjects is required. Post recognised for M.R.C.O.G. (duties mainly gynæcological). Salary £670 p.a., less £156 for residential emoluments.

Applications, stating age, experience, and nationality, together with names of 2 referees or copies of 3 testimonials, not later than 15th November, 1952, to Physician-Superintendent, Mile End Hospital, Bancroft-road, E.1. (8952.)

MILE END HOSPITAL, Bancroft-road, E.1. (475 Beds.) CASUALTY OFFICER (Senior House Officer) required for duty on 1st December, 1952.

Application forms may be obtained from Physician-Superintendent and should be returned together with copies of not more than 3 testimonials by 10th November, 1952.

NATIONAL HOSPITALS FOR NERVOUS DISEASES. Appointment of Full-time REGISTRAR (Registrar grading) to the Department of Psychological Medicine at Maida Vale Hospital for Nervous Diseases, London, W.9. Duties to commence as soon as possible. Applicants should possess experience in psychological medicine, and a higher qualification in general medicine would be an advantage. The post offers neurological and psychiatric training facilities.

Applications, with copies of 3 recent testimonials, should be addressed to the Secretary at Maida Vale Hospital, W.9, by 21st November, 1952.

NATIONAL HOSPITALS FOR NERVOUS DISEASES. HOUSE OFFICER (resident) to the Neurosurgical Department at Maida Vale Hospital for Nervous Diseases, London, W.9. Appointment in the first instance for 6 months from 1st December, 1952. Grading as Senior House Officer or Registrar according to experience.

Applications, with copies of 3 recent testimonials, should be addressed to the Secretary at Maida Vale Hospital, W.9, by 12th November, 1952.

NORTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD.

(1) REGISTRAR in General Medicine, Whipps Cross Hospital, Leytonstone, E.11. Non-resident but live in vicinity.

(2) REGISTRAR in General Medicine (non-resident), Metropolitan Hospital, Kingsland-road, E.8.

(3) MEDICAL REGISTRAR (Senior medical resident), General Hospital, Rochford, Essex. 603 Beds and developing Outpatient Department. Married or single quarters available. Post includes some duties at Southend General Hospital.

(4) REGISTRAR in Anæsthetics (resident or non-resident), Chelmsford and Essex and St. John's Hospitals, Chelmsford, Essex. Experience in anæsthetic post necessary.

(5) REGISTRAR in Anæsthetics (resident or non-resident), Harold Wood Hospital, Essex.

(6) REGISTRAR in Psychiatry (mental deficiency), non-resident, South Ockendon Hospital, near Romford, Essex.

(7) REGISTRAR in Psychiatry (resident), Runwell Hospital, near Wickford, Essex.

(8) REGISTRAR in Pathology (resident), North Middlesex Hospital, London, N.18, and Annexes. General laboratory and emergency duties. Opportunity for training in all branches. Previous experience essential.

(9) REGISTRAR in Pathology (non-resident), Queen Mary's Hospital, Stratford, E.15.

(10) REGISTRAR in Surgery (resident), Tilbury and Riverside General Hospital, Tilbury, Essex.

(11) REGISTRAR in Surgery (resident), Connaught Hospital, Walthamstow, E.17.

Appointments subject to review after 1 year.

Separate applications in duplicate, detailing date of birth, qualifications, experience, present appointment, grade, and salary, with 2 copies of 2 recent testimonials, to Secretary, 11A, Portland-place, W.1, by 15th November, 1952.

NATIONAL TEMPERANCE HOSPITAL, Hampstead-road, N.W.1. (158 Beds.) PADDINGTON GROUP HOSPITAL MANAGEMENT COMMITTEE, Paddington Hospital, Harrow-road, W.9. Applications are invited for the post of RESIDENT MEDICAL OFFICER (Senior House Officer) to commence duty on 1st December, 1952. Post is tenable for 1 year. Salary £670 p.a., less £150 p.a. for board-residence., &c.

Applications, stating age, qualifications, experience, together with names and addresses of 2 referees, to be forwarded to Secretary to Committee by 10th November, 1952.

PRINCE OF WALES'S GENERAL HOSPITAL. (219 Beds.) CLINICAL ASSISTANTSHIPS. Applications are invited from registered medical practitioners for appointment to the under-mentioned posts :—

Paid Appointments

Psychiatric Department—Tuesday afternoon (also Friday afternoon in Honorary capacity).
Psychiatric Department—Friday afternoon.
Psychiatric Department—Wednesday afternoon.
Psychiatric Department—Tuesday afternoon.
Neurological Department—Tuesday afternoon.
Allergy Department—Thursday afternoon.
Surgical Department—Monday morning and Friday afternoon.

Unpaid Appointments

Pædiatric Department—Thursday morning.
Gynæcological Department—Thursday afternoon.
Neurological Department—Tuesday afternoon.
Surgical Department—Tuesday afternoon.
Ophthalmic Department—Wednesday morning.
Genito-urinary Department—Thursday morning.
Gynæcological Department—Monday afternoon.

Applications to the Secretary, Tottenham Group Hospital Management Committee, The Green, Tottenham, N.15, by 15th November, 1952.

ROYAL NATIONAL ORTHOPÆDIC HOSPITAL, COUNTRY HOSPITAL, BROCKLEY HILL, STANMORE. Applications are invited for the appointment of RESIDENT SENIOR HOUSE OFFICER for a period of 6 months, duties to commence 16th December, 1952.

Application form can be obtained from the House Governor at 234, Great Portland-street, London, W.1.

ROYAL FREE HOSPITAL GROUP. Applications are invited from registered medical practitioners (Male or Female) for the post of RESIDENT CASUALTY OFFICER. Applicants must not be more than 10 years qualified. The appointment is for 6 months, duties to commence on 1st January, 1953. Salary and conditions of service in accordance with those laid down by the Ministry of Health for Senior House Officers.

Application forms may be obtained from the Secretary to the Board of Governors, The Royal Free Hospital, Gray's Inn-road, London, W.C.1, to whom they should be returned not later than Friday, 7th November, 1952.

ROYAL FREE HOSPITAL GROUP. Applications are invited from registered medical practitioners (Male or Female) for the post of JUNIOR RESIDENT CASUALTY OFFICER. Applicants must not be more than 10 years qualified. The appointment is for 6 months, duties to commence on 1st January, 1953. Salary and conditions of service in accordance with the Ministry of Health scale for House Officers.

Application forms may be obtained from the Secretary to the Board of Governors, The Royal Free Hospital, Gray's Inn-road, London, W.C.1, to whom they should be returned not later than 7th November, 1952.

ROYAL FREE HOSPITAL GROUP. Applications are invited from registered medical practitioners for the post of RESIDENT ANÆSTHETIST. Applicants must not be more than 10 years qualified. The appointment is for 6 months, duties to commence on 1st December, 1952. Salary and conditions of service in accordance with those laid down by the Ministry of Health for House Officers.

Application forms may be obtained from the Secretary to the Board of Governors, The Royal Free Hospital, Gray's Inn-road, London, W.C.1, to whom they should be returned not later than 4th November, 1952.

ROYAL FREE HOSPITAL GROUP. Applications are invited for the post of SENIOR HOUSE OFFICER to the Department of Rheumatology. Applicants must be registered general medical practitioners of not more than 10 years qualification. The appointment is full-time, for 6 months. Duties to commence on 1st January, 1953. Salary and conditions of service in accordance with those laid down by the Ministry of Health.

Application forms may be obtained from the Secretary to the Board of Governors, The Royal Free Hospital, Gray's Inn-road, London, W.C.1, to whom they should be returned not later than 6th November, 1952.

ROYAL FREE HOSPITAL GROUP. Applications are invited for the post of FIRST ASSISTANT (Senior Registrar grade), to the Department of Cardiology at The Royal Free Hospital. Applicants must be registered general medical practitioners of not more than 10 years qualification and have held a post as Senior Registrar in Medicine for a period of 4 years. Membership of the Royal College of Physicians is essential. The appointment is full-time, non-resident and for 1 year in the first instance, duties to commence on 1st January, 1953. Salary and conditions of service in accordance with those laid down by the Ministry of Health.

Formal application (1 copy), giving names of 3 referees, should be made to the Secretary of the Board of Governors, The Royal Free Hospital, Gray's Inn-road, London, W.C.1, before 14th November, 1952.

ROYAL FREE HOSPITAL GROUP. Applications are invited from Men and Women practitioners for the appointment of JUNIOR RESIDENT ASSISTANT PATHOLOGIST at the above Hospital. Salary in accordance with the Ministry of Health scale for House Officers. Applicants should have held at least 1 Junior House appointment. The appointment is for 6 months in the first instance, duties to commence on 1st January, 1953.

Application forms may be obtained from the Secretary to the Board of Governors, The Royal Free Hospital, Gray's Inn-road, London, W.C.1, to whom they should be returned not later than 7th November, 1952.

ROYAL CANCER HOSPITAL, Fulham-road, London, S.W.3. Applications are invited from registered medical practitioners for the 2 posts of HOUSE SURGEON (resident). Salary £400–£450 p.a. according to experience. The posts are tenable for 6 months as from 1st January, 1953.

Forms of application are obtainable from the House Governor to whom applications (together with copies of 3 recent testimonials) should be sent not later than 24th November, 1952.

ROYAL NORTHERN HOSPITAL, Holloway, London, N.7. Applications are invited for the post of HOUSE SURGEON AND CASUALTY OFFICER, vacant 28th November, 1952. Salary £400–£450 p.a., according to experience, less £100 board-residence.

Applications, stating age, qualifications, and experience, with copies of 3 testimonials, to be sent to the Hospital Secretary by 8th November.

SOUTH LONDON HOSPITAL FOR WOMEN AND CHILDREN, Clapham Common, S.W.4. Applications are invited from registered Female medical practitioners for the appointment of GYNÆCOLOGICAL HOUSE SURGEON (post recognised for the M.R.C.O.G.), to become vacant on 1st December, 1952. Appointment is for a period of 6 months.

For form of application apply to the Secretary at the Hospital.

SOUTH LONDON HOSPITAL FOR WOMEN AND CHILDREN, Clapham Common, S.W.4. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited from registered Women medical practitioners for the post of Part-time REGISTRAR for 2 sessions per week in the E.N.T. Department. The appointment is normally for 2 years but is subject to review annually. Canvassing will disqualify but candidates are not precluded from visiting the Hospital.

For forms of application apply (enclosing a stamped addressed envelope) to the Secretary, Lambeth Group Hospital Management Committee, Renfrew-road, S.E.11, to whom completed applications should be returned not later than 15th November, 1952.

SOUTH LONDON HOSPITAL FOR WOMEN AND CHILDREN, Clapham Common, S.W.4. Applications are invited from registered Female medical practitioners for the appointment of RESIDENT MEDICAL OFFICER at the Hospital's 50-Bed country branch near Crawley, Sussex. The post is full time (resident) or part time (non-resident). The appointment is of Senior House Officer grade and is for 1 year.

For form of application apply to the Secretary at the Hospital.

SOUTH EAST METROPOLITAN REGIONAL HOS-PITAL BOARD. Applications are invited for an appointment as Whole-time REGISTRAR in Orthopædic Surgery to fill a vacancy in the approved trainee establishment at the Seamen's Group of hospitals. The duties are principally at the Albert Dock Hospital, E.16, where the successful candidate must reside. Married quarters are available. The appointment will be in accordance with the terms and conditions of service of hospital medical and dental staffs (England and Wales), and will be for 1 year in the first instance.

Applications, giving particulars of age, qualifications and experience, with relevant dates, together with the names and addresses of 2 referees, to be sent to the Secretary, Registrars Committee, South East Metropolitan Regional Hospital Board, 11, Portland-place, W.1, not later than 15th November, 1952.

ST. STEPHEN'S HOSPITAL, Fulham-road, Chelsea, S.W.10. REGISTRAR to the Rheumatic Unit. This post offers experience in the rheumatic diseases and in general medicine. Candidates should preferably hold a higher degree. They may visit the Unit by appointment. (Telephone : FLA 6681, Extension 16.)

Application forms obtainable from the Secretary, St. Luke's Hospital, Sydney-street, Chelsea, S.W.3, to be returned by 15th November (enclose S.A.E., foolscap).

SOUTH WESTERN HOSPITAL, Landor-road, S.W.9. Applications are invited from registered medical practitioners for the post of SENIOR HOUSE OFFICER. The successful candidate will be required to work under the Geriatrician and the Chest Physician to whom 120 geriatric and 12 tuberculosis beds are allotted, respectively. The geriatric beds serve the whole Group and are linked with 1 of the King's Fund Homes for the aged and the tuberculosis beds are linked with St. Thomas's Hospital Teaching Unit. The post, which is resident, offers interesting work in rehabilitation in these 2 fields.

For form of application apply to the Group Secretary, Lambeth Group Hospital Management Committee, Renfrew-road, S.E.11.

ST. JAMES' HOSPITAL, Ouseley-road, Balham, S.W.12. Locum REGISTRAR required in E.N.T. Department.

Applications, stating age, qualifications, experience, and names of 2 referees, to the Group Secretary, Wandsworth Hospital Group, 14, Atkins-road, Balham, S.W.12, immediately.

ST. JAMES' HOSPITAL, Ouseley-road, Balham, S.W.12. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the post of REGISTRAR in the E.N.T. Department of the above Hospital.

Application forms (send stamped addressed foolscap envelope) obtainable from the Group Secretary, Wandsworth Hospital Group, 14, Atkins-road, Balham, S.W.12, to be completed and returned by 12th November, 1952.

ST. ALFEGE'S HOSPITAL, Greenwich, S.E.10. (504 Beds—recognised for M.R.C.O.G. examination.) HOUSE OFFICER (obstetrics and gynæcology), vacant approximately 28th November, 1952. 6 months appointment (renewable). Salary £350–£450 p.a., less £100 p.a. for residence.

Applications and testimonials to Secretary, Greenwich and Deptford Hospital Management Committee at above Hospital.

ST. ANDREW'S HOSPITAL, Bow, E.3. Applications are invited from registered medical practitioners for the appointment of HOUSE SURGEON, vacant on 20th November. Post recognised for F.R.C.S. examination.

Applications, stating age and qualifications, should be sent as soon as possible to the Medical Superintendent, St. Andrew's Hospital, Bow, E.3.

ST. NICHOLAS HOSPITAL, Plumstead, London, S.E.18. SENIOR HOUSE SURGEON, vacant 1st November. Orthopædic and E.N.T. surgery. Appointment for 6 months in first instance, and may be renewed for further period. Salary £670 p.a., less £150 p.a. for residence.

Apply to Group Secretary, Memorial Hospital, Woolwich, S.E.18.

WEST LONDON HOSPITAL, Hammersmith-road, W.6. Full-time NON-RESIDENT REGISTRAR (General and Genito-urinary) required immediately.

Applications, stating age, qualifications, experience, names of 2 referees, to Secretary, Board of Governors, The Hammersmith, West London and St. Mark's Hospitals, Ducane-road, London, W.12, by 15th November.

WEST LONDON HOSPITAL, Hammersmith-road, W.6. HOUSE SURGEON (general and gynæcology) required 1st December.

Applications, stating age, qualifications, experience, copies of 2 recent testimonials, to Secretary by 10th November.

WESTMINSTER HOSPITAL, St. John's-gardens, S.W.1. 2 SENIOR HOUSE OFFICERS required for Department of Anæsthetics for 1 years duty commencing 1st and 7th January. Candidates should have held 2 house appointments.

Applications (10 copies), stating names of 2 referees, to House Governor by 14th November.

WOOLWICH GROUP HOSPITAL MANAGEMENT COM-MITTEE. SENIOR HOUSE OFFICER in Pathology. The appointment is vacant immediately and tenable for 1 year. Duties mainly at Group Laboratory, Brook General Hospital. Salary £670 p.a., less £150 p.a. if resident.

Apply to Group Secretary, Memorial Hospital, Woolwich, S.E.18.

Provincial

For various Registrar appointments in the County of Essex please see North East Metropolitan Regional Hospital Board advertisement with London vacancies.

ASHTON, HYDE, AND GLOSSOP HOSPITAL MANAGE-MENT COMMITTEE. Applications are invited from registered medical practitioners for the following appointments :—

Ashton-under-Lyne General Hospital (800 Beds)

E.N.T. SURGEON (Senior House Officer grade) required, mainly for duty at District Infirmary, Ashton-under-Lyne (200 Beds). Post recognised for F.R.C.S. (Eng.).

HOUSE PHYSICIAN, with duties at other hospitals, vacant now.

HOUSE SURGEON (general surgery), vacant now. Post recognised for F.R.C.S. (Eng.).

Appointments are subject to Ministry of Health terms and conditions of service.

Applications, giving age, nationality, qualifications, and experience, with copies of 3 testimonials, should be forwarded to R. W. McVITY, Group Secretary.

Astley-road, Stalybridge, Cheshire.

AYLESBURY. ROYAL BUCKINGHAMSHIRE HOS-PITAL. HOUSE SURGEON for Accident and Orthopædic Department, which is centred on this Hospital and comprises 40 Beds. First or second post, vacant now.

Applications, together with 2 testimonials, to Secretary-Superintendent.

AYLESBURY. TINDAL GENERAL HOSPITAL. House SURGEON (E.N.T.), Male or Female, vacant 8th December. New department of 21 Beds with high turnover and Outpatient Clinics. Post recognised for D.L.O.

Apply with 2 testimonials to Administrative Officer as soon as possible.

AYLESBURY. TINDAL GENERAL HOSPITAL. House SURGEONS (Male and Female), first or second appointments. 1 vacancy 1st December, 1 early January. The posts offer wide experience of general surgery with operative practice and are recognised for F.R.C.S. Acute Surgical Unit of 95 Beds, no Casualty Department.

Apply with 2 testimonials to Administrative Officer as soon as possible.

ALTRINCHAM. GENERAL HOSPITAL, near Manchester. (130 Beds.) Required, HOUSE PHYSICIAN AND CASUALTY OFFICER (Senior House Officer grade). 1-year appointment. Salary and conditions of service in accordance with national scale.

Applications should be addressed to the Secretary, North and Mid-Cheshire Hospital Management Committee, The Hospital, Sinderland-road, Altrincham, Cheshire.

ALTRINCHAM. ST. ANNE'S HOSPITAL, near Manchester. (53 Beds—Recognised for D.L.O. examination. Staffed by Manchester Consultants.) NORTH AND MID-CHESHIRE HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (E.N.T.) Post offers excellent opportunities of practical experience to suitably qualified Officer, and is tenable for 12 months. Salary £670 p.a., and Ministry of Health conditions of service.

Applications, stating age, qualifications, &c., to the Secretary, North and Mid-Cheshire Hospital Management Committee, The Hospital, Sinderland-road, Altrincham, Cheshire.

ASHFORD HOSPITAL, Ashford, Middlesex. Staines GROUP HOSPITAL MANAGEMENT COMMITTEE. Required, RESIDENT SENIOR HOUSE OFFICER (Male) for wards taking cases of pulmonary tuberculosis (56 Beds) under supervision of the visiting Consultant Physician. Opportunity to acquire knowledge of the modern treatment of acute tuberculosis. Post vacant now. National Health Service salary and conditions of service.

Applications, stating age, qualifications, and experience, with copies of up to 3 recent testimonials, to Medical Director of Hospital by 8th November, 1952.

BARNSTAPLE. NORTH DEVON INFIRMARY. (110 Beds.) HOUSE SURGEON. Post vacant early December.

Applications to Group Secretary, North Devon Hospital Management Committee, 19, Alexandra-road, Barnstaple, N. Devon.

BARNET GENERAL HOSPITAL, Wellhouse-lane, Barnet, HERTS. RESIDENT HOUSE SURGEON (Male or Female) required immediately for duty in Casualty and Fracture Departments, with charge of some beds. National Health Service terms and conditions of service.

Applications, stating age, qualifications, and experience, with copies of 2 recent testimonials, to be sent as soon as possible to the Hospital Secretary.

BARNET GENERAL HOSPITAL, Barnet, Herts. Resident HOUSE PHYSICIAN required, early December.

Applications, stating age, qualifications, and experience, and enclosing copies of 2 recent testimonials, to be sent to the Hospital Secretary as soon as possible.

BARNET GENERAL HOSPITAL, Barnet, Herts. Resident HOUSE SURGEON required, early December.

Applications, stating age, qualifications, and experience, and enclosing copies of 2 recent testimonials, to be sent to the Hospital Secretary as soon as possible.

BATH. ST. MARTIN'S HOSPITAL. Applications are invited from registered medical practitioners for the post of HOUSE ANÆSTHETIST (Senior House Officer grade).

Applications, stating age, qualifications, and experience, with copies of 3 recent testimonials, should be forwarded to the undersigned, as soon as possible.

J. LAWRENCE MEARS, Secretary,
Bath Hospital Management Committee.
Manor Hospital, Bath.

BATH. ST. MARTIN'S HOSPITAL. Applications are invited from registered medical practitioners for the post of HOUSE SURGEON (gynæcology and obstetrics).

Applications, stating age, qualifications, and experience, should be forwarded to the Secretary, St. Martin's Hospital, Midford-road, Bath. J. LAWRENCE MEARS, Secretary,
Bath Hospital Management Committee.
Manor Hospital, Bath.

BASINGSTOKE, HANTS. PARK PREWETT HOSPITAL. SOUTH WEST METROPOLITAN REGION. Applications are invited for 2 PSYCHIATRIC REGISTRARS. The Hospital staffs outpatient clinics at 4 general hospitals and the admission-rate is nearly 800 a year. There will be ample opportunity for experience in all varieties of neuroses and psychoses and arrangements can be made for studying for the D.P.M. and to attend recognised neurological and Child Guidance Clinics in the Area.

Application forms can be obtained from the Group Secretary and should be returned completed within 14 days of the appearance of this advertisement.

BASINGSTOKE, HANTS. PARK PREWETT GROUP HOSPITAL MANAGEMENT COMMITTEE, NO. 47. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of Locum Tenens PSYCHIATRIC REGISTRAR at the Park Prewett Hospital, Basingstoke. Previous psychiatric experience not essential. Terms and conditions will be in accordance with national scale.

Please apply to the Group Secretary as soon as possible.

BEDFORD GENERAL HOSPITAL. (435 Beds.) 2 Resident HOUSE SURGEONS required, vacant 20th November, 1952. These appointments are recognised by the Royal College of Surgeons and offer exceptional opportunities for general experience in a busy Acute Surgical Unit.

Applications, stating age, nationality, qualifications, previous appointments, together with copies of 2 testimonials, should be forwarded to the Group Secretary, Bedford Group Hospital Management Committee, 3, Kimbolton-road, Bedford.

BEDFORD (near). BEDFORDSHIRE SANATORIUM, MOGERHANGER PARK, near BEDFORD. NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Whole-time TUBERCULOSIS REGISTRAR (resident) required at above Sanatorium. The bed complement will shortly be increased to 88 and minor thoracic surgery is undertaken. Good general medical experience essential. Sanatorium may be visited by direct appointment.

Application forms obtainable from, and returnable to, Group Secretary, Bedford Group Hospital Management Committee, 3, Kimbolton-road, Bedford, by 7th November, 1952.

BEVERLEY, YORKS. WESTWOOD HOSPITAL. Senior ORTHOPÆDIC HOUSE SURGEON required immediately. The post is recognised for the F.R.C.S. Salary £670, less a charge of £140 for board and lodging.

Detailed applications to the Secretary.

BISHOP AUCKLAND GENERAL HOSPITAL. (350 Beds.) SOUTH WEST DURHAM HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of HOUSE SURGEON (obstetrics and gynæcology) available mid-December; departmental beddage 66; hospital recognised for D.Obst.R.C.O.G. Salary £350–£450 p.a., according to previous posts held, less £100 p.a. for full residential emoluments.

Applications, stating age, nationality, qualifications, and experience, to be sent, together with the names of 2 referees, to the undersigned as soon as possible.

K. G. T. LUXFORD, Secretary/Finance Officer.
General Hospital, Bishop Auckland.

BOVEY TRACEY, DEVON. HAWKMOOR CHEST HOSPITAL. SOUTH-WESTERN REGIONAL HOSPITAL BOARD. Locum SURGICAL REGISTRAR (whole-time) required for duties in the Thoracic Surgery Unit, approximate duration of appointment 6 months.

Applications from registered medical practitioners, stating age, qualifications, and experience, with the names of 2 referees, should be sent to the Secretary of the Board, 27, Tyndalls Park-road, Bristol, 8, at once.

BIRMINGHAM. HIGHCROFT HALL HOSPITAL, ERDINGTON, BIRMINGHAM, 23. Applications are invited for the following appointments at the above Mental Hospital (1227 Beds):—

(1) JUNIOR HOSPITAL MEDICAL OFFICER (Male or Female). Salary £700–£50–£1000. Accommodation available but Officers who so desire may live outside the Hospital.

(2) RESIDENT SENIOR HOUSE OFFICER (Male or Female). Salary £670 p.a.

The Hospital has modern admission units and all forms of psychiatric treatment are undertaken. It serves an extensive area of North Birmingham and Sutton Coldfield and a large amount of outpatient work is carried out in the clinics attached to the Hospital. Opportunities are available for postgraduate studies.

Applications, giving full particulars, should be addressed to the Medical Superintendent.

BIRMINGHAM. ROYAL ORTHOPÆDIC HOSPITAL, Broad-street, BIRMINGHAM, 15. (Acute Orthopædic Hospital with 338 Beds and extensive Outpatient Service.) Applications are invited from registered medical practitioners, preferably with previous orthopædic experience, for SENIOR HOUSE OFFICER.

Applications, with copies of testimonials, to the Administrator.

BIRMINGHAM AND MIDLAND EYE HOSPITAL, Church-street, BIRMINGHAM, 3. HOUSE SURGEON required immediately. Appointment will be for 6 months but renewable. Hospital carries resident staff of 4 and provides 2-year course of instruction, which is recognised for the Diplomas of D.O. (England) and F.R.C.S. (England) in Ophthalmology. Wide experience available in all branches, including surgery.

Applications, stating age, nationality, qualifications, and experience, to Secretary, Management Committee, Dudley Road Hospital, Birmingham, 18.

BIRMINGHAM. THE UNITED BIRMINGHAM HOSPITALS. THE QUEEN ELIZABETH HOSPITAL. Applications are invited for the post of RESIDENT CLINICAL PATHOLOGIST (Senior House Officer), in the Department of Bacteriology and Clinical Pathology. This Officer will act as 1 of 3 blood-bank Officers in addition to routine work in the department. Previous experience in clinical pathology is not essential, but applicants should have had hospital postgraduate experience. The appointment is for 12 months and the salary at the rate of £670 p.a., from which £130 will be deducted for board and lodging. Further particulars can be obtained from the Director of the Clinical Pathological Services.

Application forms may be obtained from the Secretary, United Birmingham Hospitals, Queen Elizabeth Hospital, Birmingham, 15, and should be returned to him as soon as possible.

BIRMINGHAM (near). SOLIHULL HOSPITAL, Lode-lane, SOLIHULL. RESIDENT SURGICAL OFFICER (Senior House Officer). Post vacant early December, 1952. A busy General Hospital with 5 other resident medical staff.

Applications, stating age, nationality, qualifications and experience, together with copies of testimonials or names of referees, to the Medical Superintendent, within 14 days of the appearance of this advertisement.

BIRMINGHAM, 18. DUDLEY ROAD HOSPITAL. Applications are invited from suitably qualified registered medical practitioners for appointment of 2 HOUSE PHYSICIANS in Pædiatric Department. Posts vacant 9th January, 1953. The Department, under the direction of 2 Consultant Pædiatricians, consists of 88 pædiatric beds or cots and 100 neonatal cots. Posts recognised for D.C.H., facilities given for postgraduate instruction and attendance at clinics. Undergraduates of University of Birmingham attend department for clinical instruction.

Applications, stating age, qualifications, and experience, and accompanied by copies of 3 recent testimonials, to the Secretary.

BIRMINGHAM REGIONAL HOSPITAL BOARD. Applications invited for following whole-time appointments :—

(*a*) REGISTRAR in General Surgery, Birmingham (Dudley Road) Group. Duties at St. Chad's Hospital (151 Beds). Recognised for F.R.C.S. Resident appointment ; married quarters may be available. Experience in specialty desirable and possession of higher qualification an advantage.

(*b*) REGISTRAR in Accident Surgery, Birmingham (Selly Oak) Group. Duties at Birmingham Accident Hospital (215 Beds). Recognised for F.R.C.S. Resident appointment. Deduction of £140 p.a. for emoluments. Large Traumatic Unit. 50,000 new patients annually. Opportunity for practical experience in all types of injury.

(*c*) REGISTRAR in General Surgery, West Bromwich Group. Duties in Casualty Department of West Bromwich and District General Hospital. Resident appointment. Candidates should have experience in general surgery. Possession of higher surgical qualification an advantage.

(*d*) REGISTRAR in Thoracic Surgery, Stoke-on-Trent Group. Duties at Chest Unit, Cheshire Joint Sanatorium (305 Beds) and North Staffs Royal Infirmary (475 Beds). Experience in general surgery essential and higher surgical qualification an advantage.

(*e*) REGISTRAR in Chest Diseases, South Warwickshire Group. Duties at Warwick Hospital (350 Beds) and Leamington Spa and Stratford-on-Avon Chest Clinics. Close association with Thoracic Surgical Unit of Group. Successful candidate will be resident at Heathcote Hospital (29 Beds increasing to approximately 54 Beds) and will take day-to-day responsibility for patients in M.R.C. trials.

(*f*) REGISTRAR in Pathology, Stoke-on-Trent Group. Duties at City General Hospital, Stoke-on-Trent (944 Beds). Experience in specialty essential and possession of higher qualification an advantage.

Application forms from Secretary, 10, Augustus-road, Birmingham, 15, to be returned before 17th November, 1952.

BOLTON AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE.

The Royal Infirmary, Bolton (237 Beds)

RESIDENT SENIOR HOUSE OFFICER in Orthopædic Surgery, vacant immediately, tenable for 12 months, and recognised for F.R.C.S.

RESIDENT HOUSE SURGEONS (2) for general surgical duties. Posts vacant immediately, tenable for 6 months.

Bolton District General Hospital (521 Beds)

RESIDENT ANÆSTHETIST (Senior House Officer grade), vacant immediately, tenable for 12 months and recognised for the D.A.

RESIDENT HOUSE SURGEON for general surgical duties, vacant immediately, tenable for 6 months.

Applications, stating age, nationality, qualifications, experience, and the names of 2 referees, to be sent immediately to the undersigned at the Royal Infirmary, Bolton.

H. P. TRAVIS, Group Secretary.

BOLTON. THE ROYAL INFIRMARY. (237 Beds.) BOLTON AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. RESIDENT SENIOR HOUSE OFFICER in Surgery. Post recognised for F.R.C.S., vacant 5th November, tenable for 12 months and will include some duties in Casualty and Orthopædic Departments.

Applications, stating age, nationality, qualifications, experience, and the names of 2 referees, to be sent immediately to the undersigned at the Royal Infirmary, Bolton.

H. P. TRAVIS, Group Secretary.

BROMSGROVE. REGIONAL THORACIC SURGICAL CENTRE. HILL TOP HOSPITAL, BROMSGROVE. MID WORCESTERSHIRE HOSPITAL MANAGEMENT COMMITTEE. HOUSE SURGEON. Post vacant 1st January, 1953. All aspects of thoracic surgery dealt with, including cardiac, pulmonary, alimentary, and children's diseases.

Applications, with the names of 3 referees, to the Group Secretary, Mid Worcestershire Hospital Management Committee, Birmingham-road, Bromsgrove.

BROMLEY HOSPITAL. (209 Beds.) Bromley Group HOSPITAL MANAGEMENT COMMITTEE. HOUSE SURGEON required 1st December, 1952, for 6 months appointment recognised for F.R.C.S. Salary £350–£450 p.a. according to experience, less £100 p.a. for board and lodging and other services provided.

Applications, stating age, qualifications with dates, and experience, accompanied by the names and addresses of 3 referees, should be sent to the Administrative Officer, Bromley Hospital, Cromwell-avenue, Bromley, Kent.

BROMLEY HOSPITAL. (209 Beds.) Bromley Group HOSPITAL MANAGEMENT COMMITTEE. OFFICER IN CHARGE of Casualty Department required 9th December, 1952, for 6 months appointment, with facilities to gain experience with the surgical firms in the Hospital. Salary £350–£450 p.a. according to experience, less £100 p.a. for board and lodging and other services provided.

Applications, stating age, qualifications with dates, and experience, accompanied by the names and addresses of 3 referees, should be sent to the Administrative Officer, Bromley Hospital, Cromwell-avenue, Bromley, Kent.

BURY ST. EDMUNDS. WEST SUFFOLK GENERAL HOSPITAL. (290 Beds.) EAST ANGLIAN REGIONAL HOSPITAL BOARD. SURGICAL REGISTRAR. Duties include work in Orthopædic Department. The post provides wide experience in general and orthopædic surgery and is recognised for F.R.C.S. Married or single accommodation obtainable nearby. Appointment for 1 year, renewable for second year.

Applications, stating age, qualifications, and details of present and previous appointments, together with the names of 3 referees, to Secretary of Board, 117, Chesterton-road, Cambridge, by 10th November, 1952. Candidates invited to visit Hospital by direct arrangement with Hospital Management Committee Secretary at the Hospital.

BURY ST. EDMUNDS. WEST SUFFOLK GENERAL HOSPITAL. (289 Beds.) Applications are invited for the post of HOUSE SURGEON for Casualty and Orthopædic duties. Post is recognised for the F.R.C.S. and falls vacant on 31st October.

Full details to the Hospital Secretary.

BURY AND ROSSENDALE HOSPITAL MANAGEMENT COMMITTEE.

Bury General Hospital

SENIOR HOUSE OFFICER (surgical).

SENIOR HOUSE OFFICER (orthopædics).

HOUSE SURGEON. This post is recognised for the F.R.C.S.

RESIDENT CLINICAL PATHOLOGIST (Senior House Officer grade).

Rossendale General Hospital

HOUSE SURGEON.

Applications are invited for the above posts and should indicate age, nationality, qualifications, and experience, and should be sent to the undersigned as soon as possible.

H. WILKINSON, Secretary to the Committee.

Bury General Hospital, Bury, Lancs.

BRADFORD ROYAL INFIRMARY.

ORTHOPÆDIC HOUSE SURGEON/CASUALTY OFFICER, vacant now. Recognised for F.R.C.S.

HOUSE SURGEON (general), vacant now. Recognised for F.R.C.S.

HOUSE SURGEON (general and urology), vacant 1st November.

Salary for above posts £350–£450 p.a., less £100 p.a., residential emoluments.

Applications, stating age, nationality, qualifications, and experience, with copy testimonials, to Secretary.

BRADFORD. ST. LUKE'S HOSPITAL.

ORTHOPÆDIC HOUSE SURGEON/CASUALTY OFFICER, vacant 1st November. Recognised for F.R.C.S. Salary £350–£450 p.a., less £100 p.a. residential emoluments.

Applications, stating age, nationality, qualifications, and experience, with copy testimonials to Secretary, Bradford Royal Infirmary.

BRADFORD. ROYAL EYE AND EAR HOSPITAL.

HOUSE SURGEON (ophthalmic), vacant now. Hospital recognised for D.O.M.S. and F.R.C.S. Salary £350–£450 p.a., less £100 p.a. residential emoluments.

SENIOR or JUNIOR HOUSE SURGEON (E.N.T.), vacant now. Hospital recognised for D.L.O. and F.R.C.S. Salary £670 p.a., less £130 p.a. residential emoluments, or £350–£450 p.a. less £100 p.a. residential emoluments.

Applications, stating age, nationality, qualifications, and experience, to Secretary, Bradford Royal Infirmary.

BRIGHTON AND LEWES HOSPITAL MANAGEMENT COMMITTEE GROUP HOSPITALS. 2 HOUSE SURGEONS required for duties in the E.N.T. Department of the Group hospitals (78 Beds), vacant mid-December. Recognised for F.R.C.S. and D.L.O.

Applications, with details of experience, &c., together with the names and addresses of 2 referees, to be sent to the Administrative Officer, Royal Sussex County Hospital, Brighton, 7, as soon as possible.

BRISTOL. COSSHAM/FRENCHAY HOSPITAL MANAGEMENT COMMITTEE, FRENCHAY HOSPITAL. HOUSE SURGEON (Thoracic Surgery Department). Vacancies occur shortly in the above department, which is the Regional Thoracic Surgery Centre (120 Beds for the South West.)

Applications, with full particulars, should be addressed to the Group Secretary, Frenchay Hospital, Bristol, quoting "Thoracic."

CARLISLE. CUMBERLAND INFIRMARY. (322 Beds.) Applications are invited for the resident post of HOUSE OFFICER (orthopædic and fracture) for the 6 months commencing immediately.

Applications, giving the names of 2 referees, should be sent to the undersigned as soon as possible.

A. PICKERING, Group Secretary,

East Cumberland Hospital Management Committee.

Cumberland Infirmary, Carlisle.

CAERNARVON AND ANGLESEY HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the following appointments :—

Llandudno General Hospital, Llandudno

SENIOR HOUSE SURGEON (surgical), resident.

HOUSE SURGEON.

Caernarvon and Anglesey General Hospital, Bangor

HOUSE SURGEON (resident).

The appointments are for a period of 6 months. Salary and conditions of service in accordance with those approved by the Ministry of Health.

Applications, stating age, qualifications, and experience, together with the names and addresses of 2 referees, should be forwarded within 10 days of the appearance of this advertisement to the Group Secretary, Plas Gwyn, Ffriddoedd-road, Bangor, N. Wales.

CHELMSFORD AND ESSEX HOSPITAL. (163 Beds.) Applications are invited for the post of HOUSE SURGEON (resident). The post will become vacant on 30th November. This post offers good surgical experience and is recognised for the F.R.C.S.

Applications, together with 2 recent testimonials, to the Secretary, Chelmsford Group Hospital Management Committee, London-road, Chelmsford, Essex.

CHELMSFORD GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of RESIDENT GROUP ANÆSTHETIST (Senior House Officer) to large surgical units, for a period of 12 months, commencing immediately.

Applications, stating age, sex, qualifications, and experience, with recent testimonials, should be sent to the Secretary, Hospital Management Committee, Chelmsford Group, Chelmsford and Essex Hospital, London-road, Chelmsford.

CAMBRIDGE. UNITED CAMBRIDGE HOSPITALS. EAST ANGLIAN REGIONAL HOSPITAL BOARD. REGISTRARS in Psychiatry (2). Appointments will be made jointly by the 2 Boards and both Registrars will undertake duties at Addenbrooke's and Fulbourn hospitals. Posts provide facilities and full experience for the D.P.M. Appointments for 1 year subject to continuation for a second year.

Applications, stating age, nationality, qualifications, and details of present and past appointments, with names of 3 referees, to the Secretary, United Cambridge Hospitals, Addenbrooke's Hospital, Cambridge, by 15th November.

CARSHALTON, SURREY. QUEEN MARY'S HOSPITAL FOR CHILDREN. (840 Beds.) Whole-time REGISTRAR required for surgical and orthopædic duties. Applicants are invited to visit the Hospital (which is within easy reach of central London) by appointment.

Applications, on forms obtainable from the Group Secretary, Queen Mary's Hospital for Children, Carshalton, Surrey, should be submitted by 15th November, 1952.

CHELTENHAM GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners for the post of RESIDENT SENIOR HOUSE OFFICER in Pathology. The successful applicant will work in the Group Laboratory at the Cheltenham General Hospital. Salary £670 p.a., less £130 p.a. residential emoluments. The post is tenable for 1 year in the first instance.

Applications, with the names of 3 referees, to be forwarded to the undersigned forthwith stating age, qualifications, and experience. STANLEY T. DAVIS, Group Secretary.

General Hospital, Cheltenham.

CHELTENHAM GENERAL, EYE AND CHILDREN'S HOSPITAL. (220 Beds.) CHELTENHAM GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the position of HOUSE SURGEON (second or third post). Salary at the rate of £400 or £450 p.a., less £100 residential emoluments.

Applications, stating age, qualifications, experience, and enclosing copy testimonials, should be forwarded to the Secretary, Group Management Committee, General Hospital, Cheltenham.

CHESTERFIELD. SCARSDALE HOSPITAL. (619 Beds.) HOUSE SURGEON (Senior House Officer), required 1st December for obstetrics and gynæcology at the above Hospital, which has a 72-Bedded Maternity Unit and a 31-Bedded Gynæcology Unit. Hospital recognised by R.C.O.G. Ministry of Health salary and conditions.

Apply in detail to M. H. BOONE, Secretary, Chesterfield Hospital Management Committee, at the Royal Hospital, Chesterfield.

CHESTERFIELD ROYAL HOSPITAL. Casualty Officer (House Officer) required immediately at above Hospital. National salary and conditions.

Please apply— M. H. BOONE, Secretary,
Chesterfield Hospital Management Committee.

CHESTERFIELD ROYAL HOSPITAL. Senior House OFFICER required in Accident and Orthopædic Department of the above Hospital. National salary and conditions.

Applications to— M. H. BOONE, Secretary.
Chesterfield Hospital Management Committee.

CHESTERFIELD ROYAL HOSPITAL. Resident Anæs-THETIST (Senior House Officer grade) required at above Hospital, 1st December for 1 year. Post recognised for D.A. Salary £670 p.a., less £155 yearly for board, lodging, &c.

Apply, with names of 2 referees, to—
M. H. BOONE, Secretary,
Chesterfield Hospital Management Committee.

CHESTERFIELD. WALTON SANATORIUM. Sheffield REGIONAL HOSPITAL BOARD. Applications are invited from registered medical practitioners for the whole-time post of REGISTRAR (chest diseases) to the above Hospital; some Clinic work will be undertaken under the supervision of the Consultant concerned. A house is available, on a rental basis, for the successful candidate. The appointment is for 1 year in the first instance and may be renewed for a further year.

Applications, giving age, nationality, qualifications, present and previous appointments with dates together with names and addresses of 3 referees, should be sent to the Secretary, Sheffield Regional Hospital Board, Fulwood House, Old Fulwood-road, Sheffield, 10, to arrive not later than 10th November, 1952.

CHICHESTER. ROYAL WEST SUSSEX HOSPITAL. (202 Beds.) RESIDENT HOUSE SURGEON required for 6 months appointment, vacant mid-November. National scale for first, second, or third post. 6 residents including Resident Surgical Officer and 3 House Surgeons.

Applications to Senior Administrative Officer of Hospital as soon as possible.

CLACTON AND DISTRICT HOSPITAL, Clacton-on-Sea. Applications invited for post of SENIOR HOUSE OFFICER (Resident Surgical Officer). Tenable for 1 year. Salary in accordance with the terms of service issued by the Ministry of Health.

Applications, with copies of 3 recent testimonials, should be forwarded to the Secretary, Colchester Group Hospital Management Committee, 14, Pope's-lane, Colchester, Essex.

COLCHESTER. ESSEX COUNTY HOSPITAL. Applications invited for post of SENIOR REGISTRAR (Temporary) in Area Laboratory for a period of at least 6 months. Good training in general medicine and pathology desirable. Salary in accordance with Ministry of Health scale.

Applications, with names of 3 referees, to Deputy Secretary, Hospital Management Committee, 14, Pope's-lane, Colchester, Essex.

COLCHESTER. ESSEX COUNTY HOSPITAL. (192 Beds.) Applications are invited for post of HOUSE SURGEON (first, second, or third post). Tenable for 6 months. Salary and conditions of service in accordance with those approved by the Ministry of Health.

Applications, with copies of 3 recent testimonials, should be forwarded to the Deputy Secretary, Colchester Group Hospital Management Committee, 14, Pope's-lane, Colchester.

COLCHESTER. ESSEX COUNTY HOSPITAL. (192 Beds.) Applications invited for post of HOUSE PHYSICIAN (first, second, or third post). Tenable for period of 6 months from 14th December. Salary in accordance with the terms of service issued by the Ministry of Health.

Applications, with copies of 3 recent testimonials, to the Secretary, Colchester Group Hospital Management Committee, 14, Pope's-lane, Colchester, Essex.

COLCHESTER. ESSEX COUNTY HOSPITAL. (192 Beds.) Applications invited for post of HOUSE OFFICER (surgical), first, second, or third post. Tenable for 6 months from 12th November. Salary and conditions of service in accordance with those approved by the Ministry of Health.

Applications, with copies of 3 recent testimonials, should be forwarded to the Secretary, Colchester Group Hospital Management Committee, 14, Pope's-lane, Colchester, Essex.

COLCHESTER (near). NAYLAND SANATORIUM. (207 Beds.) EAST ANGLIAN REGIONAL HOSPITAL BOARD. MEDICAL REGISTRAR at above Sanatorium. Post provides wide experience in tuberculosis and diseases of the chest. Married accommodation available. Appointment for 1 year, renewable for second year.

Applications, stating age, qualifications, and details of present and previous appointments, with names of 3 referees, to Secretary of Board, 117, Chesterton-road, Cambridge, by 17th November, 1952. Candidates invited to visit Sanatorium by arrangement with the Hospital Management Committee Secretary at East Suffolk and Ipswich Hospital, Ipswich.

CHESTER ROYAL INFIRMARY. XIII Chester and DISTRICT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from medical practitioners (Male or Female), for the post of HOUSE SURGEON to the Gynæcological Department, commencing 4th November, 1952.

Applications, giving full details, together with copies of 2 recent testimonials, should be forwarded to the Group Secretary, 5, King's Buildings, Chester.

CHERTSEY, SURREY. ST. PETER'S HOSPITAL. (Late Botleys Park War Hospital—430 Beds.) Required, SENIOR HOUSE OFFICER for the Gynæcological and Special (E.N.T., Eyes, &c.) Departments. Salary in accordance with terms and conditions of National Health Service. Hospital within easy reach of London.

Applications, together with testimonials or names of referees, should be sent to the Physician-Superintendent, St. Peter's Hospital, as soon as possible.

COVENTRY AND WARWICKSHIRE HOSPITAL. (346 Beds.) HOUSE OFFICER (resident) in Anæsthetics required immediately. Hospital recognised for D.A. Excellent experience in all types of general anæsthesia.

Applications to the Secretary, Group 20 Hospital Management Committee, Coventry and Warwickshire Hospital, Coventry.

COVENTRY AND WARWICKSHIRE HOSPITAL. (346 Beds.) HOUSE SURGEON required to General Surgical Department (94 Beds). Vacant now. Hospital recognised for F.R.C.S. Post offers excellent experience in all types of general surgery.

Applications to the Secretary, Group 20 Hospital Management Committee, Coventry and Warwickshire Hospital, Coventry.

COVENTRY AND WARWICKSHIRE HOSPITAL. (346 Beds.) SENIOR HOUSE OFFICER required for Orthopædic and Fracture Department. Post vacant 1st December, 1952. Salary £670 p.a. Hospital recognised for F.R.C.S.

Applications to the Secretary, Group 20 Hospital Management Committee, Coventry and Warwickshire Hospital, Coventry.

CROYDON. GENERAL HOSPITAL. (200 Beds.) Locum MEDICAL REGISTRAR (whole-time), resident. 1st to 31st December.

Apply, giving particulars of age, qualifications, and experience, to Secretary, Croydon Group Hospital Management Committee, General Hospital, Croydon.

CROYDON. GENERAL HOSPITAL. (200 Beds.) Croydon GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for appointment of CASUALTY OFFICER (either sex) for period of 6 months in first instance. Salary £670 p.a., less £100 p.a. for board, lodging, &c.

Forms of application obtainable from GEORGE A. PAINES, Secretary, Hospital Management Committee, General Hospital, Croydon, to be returned immediately.

COTTINGHAM, E. YORKS. Senior House Officer for Raywell Sanatorium (48 Beds) and HOUSE OFFICER for Castle Hill Sanatorium (221 Beds) to work under supervision of Consultant Chest Physician. Sanatoria part of Group with major thoracic surgery and mass-radiography units and laboratory facilities.

Application forms from Group Secretary, Hull B Hospital Management Committee, De la Pole Hospital, Willerby, E. Yorkshire.

DARTFORD HOSPITAL MANAGEMENT COMMITTEE.
SENIOR HOUSE OFFICER (general surgery).
SENIOR HOUSE OFFICER (anæsthetics).
HOUSE SURGEON (general).
HOUSE SURGEON (orthopædics).

Applications, stating age, qualifications, experience, nationality, and the names of 2 persons to whom reference may be made, to be sent to the Group Secretary, The Bow Arrow Hospital, Dartford, Kent.

DERBY. DERBYSHIRE ROYAL HOSPITAL. Sheffield REGIONAL HOSPITAL BOARD. Applications are invited from registered medical practitioners for the non-resident whole-time post of REGISTRAR (neurosurgery) to the above Hospital and the Derby Groups of hospitals. The appointment is for 1 year in the first instance and may be renewed for a further year.

Applications, giving age, nationality, qualifications, present and previous appointments with dates, together with names and addresses of 3 referees, should be sent to the Secretary, Sheffield Regional Hospital Board, Fulwood House, Old Fulwood-road, Sheffield, 10, to arrive not later than 10th November, 1952.

DERBY. KINGSWAY HOSPITAL. Sheffield Regional HOSPITAL BOARD. Applications are invited from registered medical practitioners for the whole-time post of REGISTRAR (psychiatry) to the above Hospital, which is a recognised training hospital for the D.P.M. Single accommodation is available. The appointment is for 1 year in the first instance and may be renewed for a further year.

Applications, giving age, nationality, qualifications, present and previous appointments with dates, together with names and addresses of 3 referees, should be sent to the Secretary, Sheffield Regional Hospital Board, Fulwood House, Old Fulwood-road, Sheffield, 10, to arrive not later than 10th November, 1952.

DERBY CHEST CLINIC AREA. Sheffield Regional HOSPITAL BOARD. Applications are invited from registered medical practitioners for the whole-time post of REGISTRAR (chest diseases) for the Derby Chest Clinic Area and duties at the Derwent Hospital, Derby. The appointment is for 1 year in the first instance and may be renewed for a further year.

Applications, giving age, nationality, qualifications, present and previous appointments with dates, together with names and addresses of 3 referees, should be sent to the Secretary, Sheffield Regional Hospital Board, Fulwood House, Old Fulwood-road, Sheffield, 10, to arrive not later than 10th November, 1952.

DERBYSHIRE ROYAL INFIRMARY. Sheffield Regional HOSPITAL BOARD. Applications are invited from registered medical practitioners for the resident whole-time post of SENIOR SURGICAL REGISTRAR to the above Hospital. Candidates should preferably be Fellows of 1 of the Royal Colleges of Surgeons. The appointment is for 1 year in the first instance, reviewable annually. It has been agreed between the Sheffield Regional Hospital Board and the Board of Governors of the United Sheffield Hospitals that the tenure of appointment will be divided between the Derbyshire Royal Infirmary and the Teaching Hospitals.

Applications, giving age, nationality, qualifications, present and previous appointments with dates, together with names and addresses of 3 referees, should be sent to the Secretary, Sheffield Regional Hospital Board, Fulwood House, Old Fulwood-road, Sheffield, 10, to arrive not later than 17th November, 1952.

DEWSBURY. THE GENERAL HOSPITAL. Applications are invited for the post of SENIOR HOUSE OFFICER (surgical) for a period of 12 months. Terms and conditions of service will be in accordance with the regulations of the Ministry of Health, less deductions for residential charges.

Applications, stating age, qualifications, and experience, together with the names and addresses of 3 referees, should be sent immediately to the Administrative Officer at the Hospital.

DEWSBURY. THE GENERAL HOSPITAL. Applications are invited for the post of HOUSE OFFICER (surgical). The salary and conditions of service will be in accordance with the regulations of the Ministry of Health.

Applications, stating age, qualifications, and experience, together with the names and addresses of 3 referees, should be sent immediately to the Administrative Officer at the Hospital.

DENBIGH. THE NORTH WALES HOSPITAL FOR NERVOUS AND MENTAL DISORDERS. JUNIOR HOSPITAL MEDICAL OFFICER or SENIOR HOUSE OFFICER required. Flat available, suitable as single quarters or for married couple without children. The Hospital has modern treatment facilities and is associated under 1 Committee with the Child Guidance Service and Mental Deficiency Institutions in North Wales.

Applications, with names of 2 referees, to the Medical Superintendent.

SIDNEY L. FROST, Secretary to the Management Committee.

DRIFFIELD, YORKS. EAST RIDING GENERAL HOSPITAL. HOUSE PHYSICIAN required. Post vacant now. Salary £350–£450 p.a. Duties to include medical wards, casualty and some anæsthetics. Good general experience for first House appointment.

Applications to Secretary, Westwood Hospital, Beverley, E. Yorks.

DRIFFIELD, YORKS. NORTHFIELD SANATORIUM. HOUSE PHYSICIAN (first, second, or third post) required at the above Sanatorium which has 78 Beds for adults suffering from pulmonary tuberculosis. Salary £350–£450 according to previous posts held.

Detailed applications to Secretary, Westwood Hospital, Beverley, Yorks.

EDGWARE GENERAL (formerly Redhill County) HOSPITAL, EDGWARE, MIDDLESEX. RESIDENT GYNÆCOLOGICAL HOUSE SURGEON. Post vacant 23rd December. Salary £400–£450 p.a., according to experience. Deduction of £100 p.a. for board, lodging, &c. 6 months appointment.

Applications, stating age, qualifications, experience, and enclosing copies of up to 3 recent testimonials, to Medical Director of Hospital by 15th November, 1952. Candidates selected for interview will be notified by 22nd November, 1952.

EPSOM DISTRICT HOSPITAL, Dorking-road, Epsom, SURREY. (300 Beds.) RESIDENT HOUSE OFFICER (surgical) required at above Hospital. Full Consultant staff. Post vacant 9th December, 1952, recognised by Royal College of Surgeons.

Applications, stating age, qualifications and, experience, with copies of 3 recent testimonials, should be sent as soon as possible to Group Secretary at above address.

EXETER. ROYAL DEVON AND EXETER HOSPITAL. (Bed complement—319. Staff: 2 Senior Registrars, 5 Senior House Officers, 7 Junior House Officers.) EXETER AND MID-DEVON HOSPITALS MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners for the appointment of SENIOR HOUSE OFFICER (medical) with duties as House Physician to the Neurologist. Vacant 1st January, 1953. The appointment is normally for a period of 12 months. Salary £670 p.a., less deduction of £100 p.a. for residential emoluments.

Applications, with copies of 2 recent testimonials, should be forwarded to the Hospital Secretary on or before 15th November, 1952.

EPPING. ST. MARGARET'S HOSPITAL. (485 Beds—85 general surgical beds.) Applications are invited for the appointment of HOUSE SURGEON to fill an immediate vacancy. Salary on national scale, less deduction for board and lodging at the rate of £100 p.a.

Applications, with copies of 2 recent testimonials, to Group Secretary, Epping Group Hospital Management Committee, St. Margaret's Hospital, Epping, not later than 8th November, 1952.

FOLKESTONE. ROYAL VICTORIA HOSPITAL. South EAST KENT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners (Male or Female) for the post of RESIDENT HOUSE PHYSICIAN at the above Hospital. Salary will be £350, £400 or £450 a year, according to experience. A deduction of £100 a year will be made in respect of residential emoluments.

Applications, stating age, qualifications, experience, and the names and addresses of 2 responsible persons to whom reference may be made as to professional ability, should be addressed to the Group Secretary, "Ash-Eton," Radnor Park West, Folkestone.

GRIFFITHSTOWN, MON. COUNTY HOSPITAL. (234 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER in General Surgery (resident or non-resident). There are 35 surgical beds under the Consultant, while the successful candidate will also have an opportunity of attending the Outpatients Department of the Royal Gwent Hospital, and the post offers useful experience.

Apply, with the names of 2 referees, to—

T. A. JONES, Group Secretary.

64, Cardiff-road, Newport, Mon.

GRIMSBY. GENERAL HOSPITAL. Sheffield Regional HOSPITAL BOARD. Applications are invited from registered medical practitioners for the whole-time post of MEDICAL REGISTRAR to the above Hospital, with duties also at Scartho Road Infirmary, Grimsby. The appointment is for 1 year in the first instance and may be renewed for a further year.

Applications, giving age, nationality, qualifications, present and previous appointments with dates, together with names and addresses of 3 referees, should be sent to the Secretary, Sheffield Regional Hospital Board, Fulwood House, Old Fulwood-road, Sheffield, 10, to arrive not later than 10th November, 1952.

GRIMSBY GENERAL HOSPITAL. (200 Beds.) Grimsby HOSPITALS MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER for Orthopædic, Fracture and Accident Service, now vacant. Previous surgical and orthopædic experience would be an advantage.

Applications should be sent immediately to the Administrative Officer, Grimsby General Hospital.

GUILDFORD. ROYAL SURREY COUNTY HOSPITAL. CASUALTY OFFICER required. The grading is that of Senior House Officer. 2 Casualty Officers are employed who share the work of the department which is part of the Orthopædic and Traumatic Unit. Regular instruction is given in traumatic surgery and Casualty Officers take part in the work of the fracture clinics. The vacancy will occur on 1st December and the post will be resident for the first 6 months, the emoluments being valued at £175 p.a.

Applications should be sent, with copies of 3 testimonials, to the Hospital Secretary.

HASTINGS AND ST. LEONARDS. BUCHANAN HOSPITAL. (94 Beds.) HOUSE SURGEON. Post, vacant 19th November, is recognised for the M.R.C.O.G. Hospital specialises in gynæcology, E.N.T., urology, and children's surgery. National scale of salary.

Apply to Hospital Administrator.

HERTFORD COUNTY HOSPITAL. (171 Beds. Hospital situated 21 miles from London.) CASUALTY HOUSE OFFICER (Male or Female), first or second post held, with attachment to Pædiatrician and Ophthalmic Consultant. Salary £350–£400 p.a., less £100 p.a. residential emoluments. Appointment to commence as soon as possible.

Applications, with full details and references, to Secretary, County Hospital, Hertford, Herts.

HEMEL HEMPSTEAD, HERTS. WEST HERTS HOSPITAL. (169 Beds—5 residents.) CASUALTY OFFICER (Junior Hospital Medical Officer). Salary £700–£50–£1000 p.a. less £120 p.a. for residential emoluments.

Applications, giving full details, together with copies of 2 recent testimonials, should be sent to the Administrator.

HEREFORD. COUNTY HOSPITAL. (333 Beds.) HEREFORDSHIRE HOSPITAL MANAGEMENT COMMITTEE. HOUSE OFFICER (pædiatrics, &c.) required for duties mainly at the County Hospital.

Applications in writing, together with names of 2 referees to be forwarded immediately to the Medical Superintendent.

HESWALL, CHESHIRE. CLEAVER HOSPITAL. (220 Beds.) CENTRAL WIRRAL GROUP. Applications invited for post of SENIOR HOUSE OFFICER. Excellent facilities for obtaining good knowledge of modern treatment of pulmonary tuberculosis in all its branches. Applicants should have held previous House appointment and preferably should have had some experience in treatment of pulmonary tuberculosis. Applications from ex-patient practitioners welcome. Salary £670 p.a. (less £150 for emoluments) and Ministry of Health conditions.

Applications to be submitted to Physician-Superintendent immediately.

HAVERFORDWEST. PEMBROKE COUNTY WAR MEMORIAL HOSPITAL. (162 Beds—Recognised by Royal College of Surgeons.) Applications are invited for the post of RESIDENT HOUSE OFFICER (surgical). Salary £350, £400, £450 p.a., according to experience, less £100 p.a. for board and residence.

Applications, stating age, qualifications, experience, and nationality, with names and addresses of 3 referees, to Group Secretary, West Wales Hospital Management Committee, Glangwili, Carmarthen.

HAVERFORDWEST. PEMBROKE COUNTY WAR MEMORIAL HOSPITAL. (162 Beds.) Applications are invited for the post of RESIDENT HOUSE OFFICER (medical). Salary £350, £400, £450 p.a., according to experience, less £100 p.a. for board and residence.

Applications, stating age, qualifications, experience, and nationality, with names and addresses of 3 referees, to Group Secretary, West Wales Hospital Management Committee, Glangwili, Carmarthen.

HALIFAX AND HUDDERSFIELD HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of SENIOR HOUSE OFFICER in Dermatology (non-resident), vacant immediately. The duties will be equally divided between the 2 Management Groups, to which 1 Consulting Dermatologist is attached. Salary in accordance with the terms and conditions of service of hospital medical and dental staffs.

Applications, stating age, nationality, qualifications, and experience, together with copies of 3 recent testimonials, should be sent to the undersigned as soon as possible.

H. J. JOHNSON, Secretary,
Huddersfield Hospital Management Committee.
The Royal Infirmary, Huddersfield.

HALIFAX GENERAL HOSPITAL. (425 Beds.) Applications are invited for the post of PÆDIATRIC HOUSE PHYSICIAN, vacant 1st December, at the above acute General Hospital.

Applications, stating age, qualifications, and experience, with copies of 2 testimonials, to be forwarded to the Group Secretary, Royal Halifax Infirmary, Halifax.

HALIFAX GENERAL HOSPITAL. House Physician required.

Applications, stating age, qualifications, and experience, with 2 testimonials, to be forwarded to Group Secretary, Royal Halifax Infirmary, Halifax.

HEXHAM GENERAL HOSPITAL. (317 Beds.) Hexham AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. There is a vacancy for a SENIOR HOUSE OFFICER in Anæsthetics at the above Hospital, a hospital recognised by the Royal College of Surgeons and the Royal College of Obstetricians and Gynæcologists. Salary £670 p.a.

Applications, with the names of 2 referees, should be addressed to the Group Secretary, General Hospital, Hexham, Northumberland, as early as possible.

HITCHIN. LISTER HOSPITAL. (236 Beds.) North WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Whole-time MEDICAL REGISTRAR (resident) required at above Hospital. Post vacant 1st January, 1953. Hospital may be visited by direct appointment.

Application forms obtainable from, and returnable to, Secretary, Luton and Hitchin Group Hospital Management Committee, Luton and Dunstable Hospital, Luton, Beds, by 11th November, 1952.

HOUNSLOW HOSPITAL, Staines-road, Hounslow, MIDDLESEX. (General Acute—81 Beds.) STAINES GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for appointment of RESIDENT HOUSE SURGEON. 6 months appointment, vacant 26th November, 1952. Salary £350, £400 or £450 p.a. according to experience, less £100 for residence.

Applications, stating age, qualifications, &c., with copies of up to 3 recent testimonials or names for reference, to Hospital Secretary as soon as possible.

HUDDERSFIELD ROYAL INFIRMARY. (321 Beds.) HUDDERSFIELD HOSPITAL MANAGEMENT COMMITTEE. HOUSE SURGEON required to commence duty immediately. Salary in accordance with terms and conditions of service for hospital medical and dental staffs, with full residential emoluments.

Applications, together with copies of 3 recent testimonials, to be addressed to the undersigned as soon as possible.

H. J. JOHNSON, Secretary to the Management Committee.
The Royal Infirmary, Huddersfield.

HUDDERSFIELD ROYAL INFIRMARY. (321 Beds.) HUDDERSFIELD HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of SENIOR HOUSE OFFICER in Ophthalmology (non-resident), to commence duties immediately. The post is recognised for the Diploma in Ophthalmology. Salary in accordance with the terms and conditions of service of hospital medical and dental staffs.

Applications, stating age, nationality, qualifications, and experience, together with copies of 3 recent testimonials, should be sent to the undersigned as soon as possible.

H. J. JOHNSON, Secretary to the Management Committee.
The Royal Infirmary, Huddersfield.

HULL. VICTORIA HOSPITAL FOR SICK CHILDREN, Park-street. (143 Beds.) HULL A GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the following posts :—

HOUSE SURGEON. Post now vacant. 6-monthly term. Counts towards D.C.H. qualification.

SENIOR HOUSE OFFICER. Duties mainly in Casualty Department. Now vacant. Commencing salary £670 p.a.

Applications, together with testimonials, to be sent to the Hospital Secretary, at the above address.

HOVE GENERAL HOSPITAL, Sussex. (75 Beds—3 Resident Medical Officers.) BRIGHTON AND LEWES HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the following resident posts :—

HOUSE SURGEON for Casualty and with charge of surgical beds, vacant 1st December.

HOUSE PHYSICIAN, vacant 15th December. Excellent clinical material available and the post is suitable for candidates working for a higher degree.

Salaries and conditions of service in accordance with national scale—£350–£450, less £100 p.a. for residential emoluments.

Applications, stating age, qualifications, full details of experience, and enclosing names and addresses of 2 referees, should be sent to the Administrative Officer at the Hospital as soon as possible.

HILLINGDON HOSPITAL AND MOUNT PLEASANT HOSPITAL, SOUTHALL. HOUSE PHYSICIAN for Tuberculosis Beds at above Hospitals.

Copies of not more than 3 recent testimonials to the Medical Director, Hillingdon Hospital, Uxbridge, Middlesex, by 10th November.

ISLE OF THANET HOSPITAL MANAGEMENT COM-MITTEE. Applications are invited for the following posts :—

The General Hospital, Ramsgate (101 Beds)
HOUSE SURGEON.

The General Hospital, Margate (132 Beds)
HOUSE SURGEON.

The appointments will be for 6 months and are recognised for the D.A. Salary at the rate of £350–£450 p.a., according to experience, less £100 for residential emoluments.

Applications, stating age, and qualifications, together with copies of 3 recent testimonials, should be sent as soon as possible to the Hospital Secretary of the appropriate Hospital.

ILFORD. KING GEORGE HOSPITAL. There is a vacancy for a SENIOR HOUSE OFFICER ANÆSTHETIST at the above Hospital. The Officer appointed will be required to be available for duty in other hospitals in the Group. Salary will be at the rate of £670 p.a., less emoluments. Applicants should have been registered not less than 1 year.

Applications, accompanied by copies of 3 testimonials, should be sent to the undersigned within 7 days of the appearance of this advertisement.

G. AUSTIN HEPWORTH, Secretary,
Ilford and Barking Group Hospital Management Committee.
King George Hospital, Ilford.

ISLEWORTH. WEST MIDDLESEX HOSPITAL. North WEST METROPOLITAN REGIONAL HOSPITAL BOARD. ANÆSTHETIC REGISTRAR required at above Hospital. 1200 Beds with all the usual special departments. Non-resident, whole-time. Hospital may be visited by direct appointment.

Application forms obtainable from, and returnable to, the Secretary, South West Middlesex Group Hospital Management Committee, West Middlesex Hospital, Isleworth, by 11th November, 1952.

ISLEWORTH. WEST MIDDLESEX HOSPITAL. (1200 Beds.) NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. PÆDIATRIC REGISTRAR (whole-time), non-resident, required at above Hospital. Previous pædiatric experience desirable. Duties include work in the Children's Unit, Neonatal Unit, and Pædiatric Outpatients Clinics. Post vacant 1st January, 1953. Candidates are welcome to visit the Hospital by direct appointment.

Application forms obtainable from, and returnable to, Secretary, South West Middlesex Group Hospital Management Committee, West Middlesex Hospital, Isleworth, by 11th November, 1952.

ISLEWORTH. WEST MIDDLESEX HOSPITAL. (1200 Beds.) NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. REGISTRAR to the Geriatric Unit required at above Hospital. Whole-time, non-resident. Hospital may be visited by direct appointment.

Application forms obtainable from, and returnable to, Secretary, South West Middlesex Group Hospital Management Committee, West Middlesex Hospital, Isleworth, by 11th November, 1952.

IPSWICH. EAST SUFFOLK AND IPSWICH HOSPITAL. (360 Beds.) Applications are invited for the post of JUNIOR HOUSE SURGEON to the Orthopædic Consultant. The grade will be that of House Officer first, second, or third, according to experience.

Applications, stating age, sex, nationality, qualifications, and experience, with copies of recent testimonials, to the Hospital Secretary.

IPSWICH. EAST SUFFOLK AND IPSWICH HOSPITAL. (360 Beds.) Applications are invited for the post of SENIOR HOUSE SURGEON to the Fracture and Orthopædic Department. The post is graded Senior House Officer and is vacant from 1st November, 1952. The Department has 2 Consultants, about 60 Beds and a large outpatient attendance.

Applications, stating age, nationality, experience, and copies of 3 recent testimonials, to Hospital Secretary.

KINGSTON HOSPITAL, 26, Wolverton-avenue, Kingston-ON-THAMES. (500 Beds.) SOUTH WEST METROPOLITAN REGION. KINGSTON GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the position of Whole-time REGISTRAR (obstetrics and gynæcology). The appointment will be subject to the provisions of the National Health Service superannuation regulations and becomes vacant on 1st January, 1953. The post is recognised for qualifying service for the M.R.C.O.G. examination. Applications from suitably qualified medical practitioners who would be prepared to act as locum tenens from about 20th November, 1952, would be considered. Such applicants would be considered for the permanent appointment.

Forms of application for the permanent appointment may be obtained from the Group Secretary (a foolscap stamped addressed envelope to be enclosed) and the completed forms returned to the Secretary, 35, Coombe-road, Kingston-on-Thames, within 14 days of the appearance of this advertisement.

LEICESTER GENERAL HOSPITAL. (445 Beds.) Appli-cations are invited for 4 appointments of SENIOR HOUSE OFFICER to the Surgical Department of the above Hospital. The appointments, which will be tenable for 1 year, will consist of 6 months general surgery and 6 months in the special Departments of Orthopædics, Plastics, and E.N.T. The period spent in general surgery is recognised for the F.R.C.S. Diploma. There are 240 surgical Beds and a non-specialist medical staff of 16. The posts will become vacant on the 1st January, 1953.

Applications, together with copies of 3 recent testimonials, to the Secretary, No. 1 Hospital Management Committee, 38A, East Bond-street, Leicester, not later than 8th November, 1952.

LEICESTER GENERAL HOSPITAL. (445 Beds.) Applications are invited for the post of HOUSE SURGEON, vacant 1st January, 1953. Recognised for F.R.C.S.

Applications, together with copies of recent testimonials, to the Secretary, No. 1 Hospital Management Committee, 38A, East Bond-street, Leicester, not later than 8th November, 1952.

LEICESTER ROYAL INFIRMARY. Sheffield Regional HOSPITAL BOARD. Applications are invited from registered medical practitioners for the non-resident whole-time post of REGISTRAR (dermatology) to the above Hospital. The appointment is for 1 year in the first instance and may be renewed for a further year.

Applications, giving age, nationality, qualifications, present and previous appointments with dates, together with names and addresses of 3 referees, should be sent to the Secretary, Sheffield Regional Hospital Board, Fulwood House, Old Fulwood-road, Sheffield, 10, to arrive not later than 10th November, 1952.

LEICESTER ROYAL INFIRMARY. An immediate vacancy occurs for the post of SENIOR HOUSE OFFICER (Casualty Department) until 31st December next (1 of 2). The post is non-resident and provides opportunities for the successful candidate to devote time for studies.

Applications forthwith to Secretary, No. 1 Hospital Management Committee, 38A, East Bond-street, Leicester.

LEICESTER ROYAL INFIRMARY. Applications are invited for the post of HOUSE SURGEON to the E.N.T. Department for a period of 6 months commencing immediately. The post is recognised for the D.L.O. and the F.R.C.S.

Applications, stating age, experience, and qualifications, together with copies of recent testimonials, to the Secretary, No. 1 Hospital Management Committee, 38A, East Bond-street, Leicester.

LIVERPOOL. THE UNITED LIVERPOOL HOSPITALS. Applications are invited for a post as REGISTRAR in Psychiatry with duties in the first instance at the Royal Liverpool Children's Hospital. The appointment is for the period to 30th September, 1953, but annual reappointment until completion of the normal period of training will be considered without need for further application.

Applications on forms from the undersigned should be returned by 12th November, 1952. A. V. J. HINDS, Secretary.

The United Liverpool Hospitals, 80, Rodney-street, Liverpool, 1.

LIVERPOOL. THE UNITED LIVERPOOL HOSPITALS. ROYAL INFIRMARY, DAVID LEWIS NORTHERN HOSPITAL, ROYAL LIVERPOOL CHILDREN'S HOSPITAL. Applications are invited for appointments as RESIDENT HOUSE SURGEONS (orthopædic) for the period to 31st March, 1953. Applicants appointed to posts at the Royal Infirmary and the David Lewis Northern Hospital will be required to undertake some casualty work as part of their normal duties.

Applications on forms from the undersigned should be returned as soon as possible. A. V. J. HINDS, Secretary.

The United Liverpool Hospitals, 80, Rodney-street, Liverpool, 1.

LIVERPOOL. THE UNITED LIVERPOOL HOSPITALS. LIVERPOOL STANLEY HOSPITAL. Applications are invited for an appointment as SENIOR HOUSE OFFICER (orthopædics) for the period to 30th September, 1953.

Applications, on forms from the undersigned, should be returned as soon as possible. A. V. J. HINDS, Secretary.

The United Liverpool Hospitals. 80, Rodney-street, Liverpool, 1.

LINCOLN. COUNTY HOSPITAL. (200 Beds.) Lincoln NO. 1 HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER in Pathology (resident). Terms and conditions of service in accordance with those laid down for hospital medical and dental staffs.

Applications, together with copies of 3 recent testimonials, to be forwarded to the undersigned as soon as possible.

R. W. HOWICK, Group Secretary.

LOUTH, LINCS. COUNTY INFIRMARY. (200 Beds.) Applications are invited for the post of RESIDENT HOUSE OFFICER which is now vacant at this General Hospital. Duties include obstetrics and gynæcology. A deduction of £100 p.a. will be made for residential emoluments.

Applications, giving full particulars, together with names of 2 referees, to be addressed to the Hospital Secretary.

LEEDS REGIONAL HOSPITAL BOARD. Short-term LOCUM TENENS appointments in the Registrar grade are constantly available at hospitals in the area of the Board, particularly in the specialties of General Medicine and General Surgery.

Suitably experienced practitioners interested in such appointments are invited to communicate with the Secretary, Joint Registrars Committee, Park-parade, Harrogate.

LEEDS. UNITED LEEDS HOSPITALS. Applications are invited for the post of HOUSE OFFICER to the Department of Neurosurgery at the General Infirmary at Leeds. The post, which is resident, affords opportunity of valuable experience in this specialty.

Applications, stating age, sex, nationality, qualifications, previous experience, and giving the names of 3 referees, to be forwarded as soon as possible to—

S. CLAYTON FRYERS, Secretary to the Board.

The General Infirmary, Leeds.

LEEDS. UNITED LEEDS HOSPITALS. Applications are invited for the post of HOUSE SURGEON to the Department of Ophthalmology at the General Infirmary at Leeds. The post is resident and now vacant.

Applications, stating age, sex, nationality, qualifications, and previous posts with dates, together with the names of 3 referees, to be forwarded as soon as possible to the undersigned.

S. CLAYTON FRYERS, Secretary to the Board.

The General Infirmary, Leeds.

LEEDS. UNITED LEEDS HOSPITALS. Applications are invited for the appointment of REGISTRAR in the Department of Anæsthetics at the General Infirmary at Leeds. The appointment which is non-resident will be for a period of 1 year in the first instance and will be subject to the National Health Service (Superannuation) Regulations, 1950.

Applications, stating age, qualifications, and details of present and previous appointments with dates, together with the names of 3 referees, should be forwarded to the Medical Secretary, Joint Registrars Committee, School of Medicine, Leeds, 2, not later than 19th November, 1952.

LEEDS. UNITED LEEDS HOSPITALS. Applications are invited for the post of HOUSE OFFICER to the E.N.T. Department at the General Infirmary at Leeds. The post is resident and will become vacant on 1st November, 1952.

Applications, stating age, sex, nationality, qualifications, and previous posts with dates, together with the names of 3 referees, to be forwarded as soon as possible to—

S. CLAYTON FRYERS, Secretary to the Board.

The General Infirmary, Leeds.

LEEDS, 2. PUBLIC DISPENSARY AND HOSPITAL. Applications are invited from registered medical practitioners for the appointment of CASUALTY OFFICER (Senior House Officer) at the above Hospital. The appointment will be for a period of 1 year. Salary in accordance with the agreed terms and conditions of service of hospital medical and dental staffs, with an appropriate deduction in respect of board, lodgings, &c.

Applications, stating age, qualifications, experience, &c., together with the names of 3 persons to whom reference may be made, to be forwarded as soon as possible to—

J. FOLKARD, Secretary to the Committee.

Administrative Offices, St. James's Hospital, Leeds, 9.

LEEDS. KILLINGBECK (TUBERCULOSIS) HOSPITAL, York-road. (227 Beds—Male and Female.) LEEDS (GROUP B) HOSPITAL MANAGEMENT COMMITTEE NO. 22. JUNIOR HOSPITAL MEDICAL OFFICER. The Hospital is fully equipped for the treatment of pulmonary tuberculosis and is closely associated with the Thoracic Surgery Unit. Good residential accommodation is provided. Salary scale £700–£50–£1000 p.a.

Applications to the Group Secretary, Seacroft Hospital, Leeds.

LEAMINGTON SPA. WARNEFORD GENERAL HOSPITAL. (207 Beds.) SOUTH WARWICKSHIRE HOSPITAL GROUP (NO. 14). HOUSE SURGEON for Ophthalmic and E.N.T. Departments, tenure of post 6 months. Salary dependent on number of posts previously held and in accordance with terms and conditions of service for hospital medical and dental staffs.

Apply as soon as possible to Hospital Secretary.

LEAMINGTON SPA. WARNEFORD GENERAL HOSPITAL. (207 Beds.) SOUTH WARWICKSHIRE HOSPITAL GROUP (NO. 14). Applications are invited for the appointment of RESIDENT ANÆSTHETIST. R practitioners holding first appointments may apply. 6 months appointment. The post is recognised for the D.A. Salary £300 or £350, according to the previous number of appointments held, plus full residential emoluments.

Apply as soon as possible to the Hospital Secretary.

MANSFIELD (near), NOTTS. HARLOW WOOD ORTHOPAEDIC HOSPITAL. (340 Beds.) Applications are invited from registered medical practitioners for the posts of RESIDENT SENIOR HOUSE OFFICERS. The posts are recognised for examination purposes by the Royal College of Surgeons.

Applications, with references or names of referees, to Secretary, Nottingham No. 5, Hospital Management Committee, Harlow Wood, near Mansfield.

MANSFIELD. RANSOM SANATORIUM. Nottingham NO. 5 HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the resident post of SENIOR HOUSE OFFICER. The Sanatorium contains 182 Beds for the treatment of pulmonary tuberculosis in men, women, and children, including a modern Thoracic Surgery Unit. Salary £670 p.a., less £150 for full residential emoluments which include a comfortable flat.

Applications, stating age, qualifications, and experience, and enclosing copies of 2 recent testimonials, to be sent to the Group Secretary, Harlow Wood Hospital, near Mansfield.

MAIDSTONE (near). LENHAM SANATORIUM. (172 Beds.) MID-KENT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of SENIOR HOUSE OFFICER at Lenham Sanatorium, near Maidstone. The Sanatorium has 172 Beds for the treatment of pulmonary tuberculosis. Salary £670 a year, with a deduction of £150 a year for residential emoluments. Appointment for 12 months.

Applications to Physician-Superintendent, Lenham Sanatorium, near Maidstone.

MAIDSTONE. KENT COUNTY OPHTHALMIC AND AURAL HOSPITAL. (113 Beds.) MID-KENT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of SENIOR HOUSE SURGEON in the E.N.T. Department of the above Hospital. There are 55 E.N.T. beds and 6 specialist operating sessions each week. Valuable experience is available and the post is recognised for the purposes of the F.R.C.S. and the D.L.O. Salary will be £670 a year, less £150 a year for residential emoluments.

Applications immediately to the Administrative Officer, Kent County Ophthalmic and Aural Hospital, Maidstone, Kent.

MAIDSTONE. KENT COUNTY OPHTHALMIC AND AURAL HOSPITAL. (113 Beds.) MID-KENT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of SENIOR HOUSE OFFICER in the Ophthalmic Department of the above Hospital. The Hospital is recognised by the Examining Boards for the F.R.C.S. and the D.O. Salary £670 a year, less £150 a year for residential emoluments.

Applications should be forwarded as soon as possible, to the Administrative Officer, Kent County Ophthalmic and Aural Hospital, Church-street, Maidstone.

MAIDSTONE. WEST KENT GENERAL HOSPITAL. (135 Beds.) MID-KENT HOSPITAL MANAGEMENT COMMITTEE GROUP 13. Applications are invited for the appointment of HOUSE SURGEON at the above Hospital. R practitioners holding first House Officer posts may apply. 6 months appointment. Salary at the rate of £350, £400, or £450, according to experience. A deduction at the rate of £100 a year is made in respect of board and lodging and other services provided.

Applications should be forwarded as soon as possible to the Administrative Officer at the Hospital.

MANCHESTER. WEST MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners for the following posts :—

Park Hospital, Davyhulme (General Hospital—426 Beds)

SENIOR HOUSE OFFICER (pædiatrics), now vacant.

SENIOR HOUSE OFFICER (general medicine), vacant 1st January, 1953.

HOUSE OFFICER (general medicine), now vacant.

HOUSE OFFICER (casualty and orthopædic), now vacant.

HOUSE OFFICER (non-tuberculous thoracic surgery) for Manchester Regional Hospital Board Centre, now vacant.

HOUSE OFFICER (general surgery) with some duties in E.N.T. work, now vacant.

The Pædiatric Unit comprises 36 Beds and Cots, including 10 non-tuberculous thoracic surgery beds. Vacancies occur periodically in the various departments at Park Hospital, and House Officers are eligible for appointment to another specialty at the end of the original term of service when such vacancies occur.

Eccles and Patricroft Hospital (General Hospital—72 Beds)

SENIOR HOUSE OFFICER, now vacant.

HOUSE OFFICER, now vacant.

The work of the Hospital is mainly surgical and there is a busy Outpatient Department.

Salaries for House Officer posts £350–£450 p.a., according to experience, £100 p.a. deduction for residential accommodation and services, 6 months appointments. The Senior House Officer appointments will be for 12 months at a salary of £670 p.a., less £130 p.a. (Eccles and Patricroft Hospital); £155 p.a. (Park Hospital), for residential accommodation and services.

Application forms from the Secretary, Park Hospital, Davyhulme, Manchester.

MANCHESTER. UNITED MANCHESTER HOSPITALS. MANCHESTER ROYAL INFIRMARY, MANCHESTER, 13. REGISTRAR to the Department of Diagnostic Radiology, to commence as soon as possible. Whole-time appointment for 12 months, renewable. Applicants must possess the D.M.R.D. or its equivalent.

Applications to be made on forms obtainable from the undersigned and to be returned not later than 19th November, 1952. G. H. TAYLOR, Secretary.

MANCHESTER. UNITED MANCHESTER HOSPITALS. MANCHESTER ROYAL INFIRMARY, MANCHESTER, 13. ANÆSTHETICS HOUSE OFFICER, to commence as soon as possible. The appointment is for 6 months at a salary of £400 or £450 p.a., with a deduction at the rate of £100 p.a. in respect of board and lodging and other services provided. Applicants should have had experience in the specialty.

Applications to be made on forms obtainable from the undersigned, and to be returned not later than 12th November, 1952.

F. J. CABLE, Secretary to the Board of Governors.

MANCHESTER. UNITED MANCHESTER HOSPITALS. MANCHESTER ROYAL EYE HOSPITAL. Required, HOUSE SURGEON (first or subsequent post). Salary £350–£450 p.a., according to the number of positions previously held, less £100 p.a. for residential emoluments. Appointment of a practitioner within 3 months of qualification and subject to National Service Acts would be limited to 6 months.

Application forms available on application to—

H. R. NORTH, General Superintendent.

MANCHESTER. UNITED MANCHESTER HOSPITALS. MANCHESTER ROYAL EYE HOSPITAL. Applications are invited for RESIDENT MEDICAL STAFF (Senior House Officer grading—£670 p.a., less £100 p.a. for residential emoluments).

Application forms may be obtained from the undersigned.

H. R. NORTH, General Superintendent.

NORTH WEST DURHAM HOSPITAL MANAGEMENT COMMITTEE. SHOTLEY BRIDGE GENERAL HOSPITAL, SHOTLEY BRIDGE, CO. DURHAM. RICHARD MURRAY MATERNITY HOSPITAL, BLACKHILL, CO. DURHAM. Applications are invited from registered medical practitioners for the appointment of SENIOR HOUSE OFFICER (obstetrics and gynæcology). The appointment is for 1 year and the salary is £670 p.a., less emoluments valued at £130. Applicants must have been qualified not less than 1 year. The successful applicant will reside in the Maternity Hospital and will have duties in both Obstetrical and Gynæcological Departments, including clinics. The post is recognised for the D.Obst. R.C.O.G. for Obstetrics, and the M.R.C.O.G. for Gynæcology.

Early application, accompanied by copies of 3 testimonials, should be made to the Secretary.

A. LAWTHER, F.C.C.S., A.H.A.

Shotley Bridge General Hospital, Shotley Bridge, co. Durham.

NORWICH. NORFOLK AND NORWICH HOSPITAL. (440 Beds.) EAST ANGLIAN REGIONAL HOSPITAL BOARD. SURGICAL REGISTRAR at the above Hospital. The post offers wide experience in all aspects of general surgery and is recognised for the F.R.C.S. Appointment for 1 year, renewable for second year.

Applications, stating age, qualifications, and details of present and previous appointments, together with the names of 3 referees, to Secretary of Board, 117, Chesterton-road, Cambridge, by 17th November, 1952. Candidates invited to visit the Hospital by direct arrangement with the Hospital Management Committee Secretary at the Hospital.

NORWICH. NORFOLK AND NORWICH HOSPITAL. (440 Beds.) SENIOR CASUALTY OFFICER AND HOUSE SURGEON to the Septic Block, Male or Female, post vacant 1st January, 1953 (2 Casualty Officers employed). Salary £670 p.a., less £150 p.a. for full residential emoluments.

Applications, stating age, experience, qualifications, with names of 2 referees, to Secretary, Norwich, Lowestoft and Gt. Yarmouth Hospital Management Committee, St. Stephen's-road, Norwich.

NORWICH. NORFOLK AND NORWICH HOSPITAL. Applications are invited for the post of HOUSE PHYSICIAN (Male or Female) to the West Norwich and Norwich Isolation Hospitals. Duties include acute medical, geriatric, and infectious diseases. The beds at these Units are under the control of the Consultant Physicians of the Norfolk and Norwich Hospital and the successful candidate will be required to undertake general medical duties under their supervision. Salary £350, £400, or £450 p.a. according to experience, less deduction of £100 for residential emoluments.

Applications, stating age, qualifications, experience, with names of 2 referees, to Secretary, Group 6 Hospital Management Committee, St. Stephen's-road, Norwich.

NEWCASTLE. THE UNITED NEWCASTLE UPON TYNE HOSPITALS. ROYAL VICTORIA INFIRMARY. Applications are invited for the whole-time post of SENIOR REGISTRAR in the Department of Radiotherapy. Candidates should hold a recognised diploma in radiotherapy or a higher qualification in medicine or surgery.

Applications, giving full particulars, with the names and addresses of 3 referees, should be sent to the undersigned within 2 weeks of the appearance of this advertisement.

A. W. SANDERSON, House Governor and Secretary.

Royal Victoria Infirmary, Newcastle upon Tyne.

NEWMARKET GENERAL HOSPITAL, Newmarket, SUFFOLK. Applications are invited for the post of HOUSE SURGEON (post vacant 1st December, 1952). Duties include house charge of general surgical, E.N.T., and eye cases. The post is resident and available for 6 months.

Applications, with copies of 3 testimonials, to the Physician-Superintendent.

NEWPORT, I.W. ST. MARY'S HOSPITAL. Casualty OFFICER (Senior House Officer), vacant now. Salary £670, less £130 for accommodation and services.

Applications to Chief Administrative Officer, Clatterford House, Newport, I.W., with copy testimonials.

NEWPORT, MON. ROYAL GWENT HOSPITAL. (259 Beds—recognised for D.A.) Applications are invited for the post of SENIOR HOUSE OFFICER (anæsthetics). The post is non-resident and based at this Hospital, but opportunities exist for attending neighbouring hospitals also. The successful candidate will receive a thorough training with the Consultants, and the post offers extensive experience.

Apply, with the names of 2 referees, to T. A. JONES. 64, Cardiff-road, Newport, Mon.

NORTHAMPTON/KETTERING DISTRICT HOSPITAL MANAGEMENT COMMITTEES. Applications are invited for the resident or non-resident post of Locum Tenens REGISTRAR in Dermatology and Venereal Disease. Appointment for a period of approximately 6 months, commencing forthwith.

Applications should be sent to the Secretary, Northampton Hospital Management Committee, Northampton General Hospital, Billing-road, Northampton, before 15th November.

NOTTINGHAM AREA CHEST SERVICE. Sheffield REGIONAL HOSPITAL BOARD. Applications are invited from registered medical practitioners for the resident whole-time post of REGISTRAR in the above Service. The main duties will be carried out at the King's Mill Hospital, Mansfield, which will include attendance at the Chest Clinic and work on the tuberculosis wards. Single accommodation is available at this Hospital. The successful candidate may also be required to attend the Nottingham Chest Clinic and M.R. Unit. The appointment is for 1 year in the first instance and may be renewed for a further year.

Applications, giving age, nationality, qualifications, present and previous appointments with dates, together with names and addresses of 3 referees, should be sent to the Secretary, Sheffield Regional Hospital Board, Fulwood House, Old Fulwood-road, Sheffield, 10, to arrive not later than 17th November, 1952.

NOTTINGHAM GENERAL HOSPITAL. Applications are invited from registered medical practitioners for the post of ORTHOPÆDIC AND FRACTURE SENIOR HOUSE OFFICER. The post offers exceptional experience in traumatic surgery. Duties to commence as soon as possible. Salary £670 p.a., less £150 residential emoluments.

Applications, with copies of testimonials should be sent as soon as possible to HENRY M. STANLEY, Secretary.

NOTTINGHAM AND MIDLAND EYE INFIRMARY. HOUSE SURGEON (resident) required at the above Infirmary. Salary and conditions of service in accordance with the published conditions of the Ministry of Health. Duties to commence immediately. This post is recognised for the D.O.M.S. examination.

Applications, stating age, qualifications, and experience, together with copies of testimonials, to be sent to—

H. M. STANLEY, Secretary,

Nottingham No. 1 Hospital Management Committee, General Hospital, Nottingham.

NUNEATON. MANOR HOSPITAL. (139 Beds.) House SURGEON (general duties) required immediately, for general surgical, E.N.T., and Ophthalmic Departments. Post recognised for F.R.C.S.

Applications to the Hospital Secretary.

NUNEATON. MANOR HOSPITAL. (139 Beds.) Applications are invited for the post of HOUSE PHYSICIAN (32 general medical beds). Good general experience in well-equipped hospital. Post vacant 9th November.

Applications to the Hospital Secretary.

NUNEATON. GEORGE ELIOT HOSPITAL. (289 Beds.) HOUSE SURGEON required for general surgical duties (54 Beds).

Applications to the Medical Superintendent.

OXFORD. UNIVERSITY OF OXFORD. Oxford Regional HOSPITAL BOARD. Applications are invited from registered medical practitioners holding an M.S. or an F.R.C.S. for the post of SENIOR REGISTRAR in General Surgery to the Hospitals of the Aylesbury Area. The appointment will be for 1 year in the first instance and eligible for extension to 4 years subject to satisfactory annual review.

Applications on forms obtainable from the Secretary, Registrar Committee, 43, Banbury-road, Oxford, should reach him by 22nd November.

OXFORD. WINGFIELD-MORRIS ORTHOPÆDIC HOSPITAL, HEADINGTON, OXFORD, invites applications from suitably qualified persons for the post of SENIOR HOUSE OFFICER to commence on 1st December, 1952. The post is resident and tenable in the first instance for 6 months.

Applications, together with the names and addresses of 2 referees, to be submitted as soon as possible to the Secretary.

OXFORD. UNITED OXFORD HOSPITALS. Applications invited for the post of SENIOR HOUSE OFFICER to the Department of Dermatology, Slade Hospital, Oxford, for 6 months commencing 1st November, 1952.

Applications, stating age, qualifications, and experience, together with the names of 2 referees, to Administrator, Radcliffe Infirmary, Oxford.

OXFORD. UNITED OXFORD HOSPITALS. Applications invited for the post of HOUSE SURGEON to Department of Otolaryngology at the Radcliffe Infirmary for 6 months commencing 14th November, 1952.

Applications, stating age, qualifications, and experience, together with names of 2 referees, to Administrator, Radcliffe Infirmary, Oxford.

PENZANCE. WEST CORNWALL HOSPITAL. (General Hospital—100 Beds.) WEST CORNWALL HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners for the appointment of HOUSE PHYSICIAN (Male) which falls vacant on 31st December, 1952. Salary at the rate of £350 or £400 p.a., from which a deduction at the rate of £100 p.a. will be made for board-residence, &c.

Applications, stating age, qualifications with dates, nationality, and present post, and accompanied by copies of 3 recent testimonials, should be forwarded to the Hospital Secretary, West Cornwall Hospital, Penzance.

PENZANCE. WEST CORNWALL HOSPITAL. (General —100 Beds.) WEST CORNWALL HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners for the post of CASUALTY HOUSE SURGEON. Post vacant 4th November, 1952.

Applications, stating age, nationality, qualifications, and experience, and enclosing copies of 2 recent testimonials, should be forwarded to the Hospital Secretary, West Cornwall Hospital, Penzance.

PETERBOROUGH. THE MEMORIAL HOSPITAL. PETERBOROUGH AREA HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the position of SENIOR HOUSE OFFICER (orthopædic), vacant now. Salary £670 p.a. Exceptional experience offered in busy department.

Apply to the Secretary, Memorial Hospital, Peterborough.

PLYMOUTH. SOUTH DEVON AND EAST CORNWALL HOSPITAL. Applications invited from registered medical practitioners for the appointments of :—

(1) RESIDENT DENTAL HOUSE SURGEON, Greenbank Road Section, vacant 9th December, 1952. This post is recognised by the Royal College of Surgeons as fulfilling the requirements of candidates for the Fellowship of Dental Surgery.

(2) SENIOR HOUSE OFFICER in Anæsthetics, Freedom Fields Section, vacant immediately.

(3) HOUSE SURGEON, Freedom Fields Section, vacant 1st January, 1953, recognised for the Fellowship of the Royal College of Surgeons.

(4) SENIOR HOUSE OFFICER in Surgery, vacant 26th January, 1953, Devonport Section.

(5) HOUSE PHYSICIAN, Greenbank Road Section, vacant 1st January, 1953.

Applications, stating age, nationality, qualifications, and experience, with the names of 3 referees, to be sent to the undersigned as soon as possible.

ARTHUR R. CASH, Secretary.

7, Nelson-gardens, Devonport.

PORTSMOUTH GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of RESIDENT ANÆSTHETIC SENIOR HOUSE OFFICER. Duties will be mainly at Queen Alexandra Hospital, Cosham.

Applications, stating age, experience, and qualifications, should be submitted to E. H. HURST.

35, Grove-road South, Southsea.

PORTSMOUTH GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of HOUSE PHYSICIAN for Queen Alexandra Hospital (62 medical beds).

Applications, stating age, experience, and qualifications, and names of 2 referees, should be submitted as soon as possible to E. H. HURST.

35, Grove-road South, Southsea.

PORTSMOUTH. ROYAL PORTSMOUTH HOSPITAL. PORTSMOUTH GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of ORTHOPÆDIC SENIOR HOUSE OFFICER at the above Hospital. This is the main Orthopædic and Accident Centre of the Group, serving a population of 500,000.

Applications, stating age, experience and qualifications, and names of 2 referees, should be submitted as soon as possible to—

E. H. HURST, Group Secretary.

35, Grove-road South, Southsea, Hants.

PORTSMOUTH. SAINT MARY'S GENERAL HOSPITAL. Applications are invited for the appointment of HOUSE SURGEON at above Hospital, with 150 surgical beds, which is recognised for the F.R.C.S.

Applications, stating age, experience, and qualifications, and names of 2 referees, should be submitted as soon as possible to—

E. H. HURST,

Portsmouth Group Hospital Management Committee.

35, Grove-road, South, Southsea.

POOLE GENERAL HOSPITAL, Poole, Dorset. BourneMOUTH AND EAST DORSET HOSPITAL MANAGEMENT COMMITTEE. HOUSE SURGEON required immediately. The Hospital is recognised for the F.R.C.S. and F.R.C.S.E.

Applications to the Hospital Secretary, of the Hospital.

READING. ROYAL BERKSHIRE AND ASSOCIATED HOSPITALS. Applications are invited for the post of Locum Tenens SENIOR REGISTRAR in General Medicine. Appointment for a period of approximately 6 months, commencing forthwith.

Applications should be sent to the Group Secretary, The Reading and District Hospital Management Committee, 3, Craven-street, Reading, before 15th November.

READING. ROYAL BERKSHIRE HOSPITAL. (403 Beds.) Applications invited from registered medical practitioners for posts of 2 HOUSE SURGEONS, vacant 1st and 5th December. F.R.C.S. recognised. Deduction for residence £100. Periods of 6 months.

Applications, stating age, qualifications with dates, nationality, present post, together with copies of 3 recent testimonials, to Hospital Assistant Secretary.

ROCHDALE AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE.

HOUSE SURGEON, Birch Hill Hospital.

HOUSE SURGEON, Rochdale Infirmary.

Both these appointments are recognised by the Royal College of Surgeons for 6 of the 12 months period of surgical training required of candidates for the final Fellowship examination.

Applications to the Group Secretary, Birch Hill Hospital, Rochdale.

ROCHDALE. BIRCH HILL HOSPITAL. (General —956 Beds.) ROCHDALE AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of SENIOR HOUSE OFFICER (anæsthetic), which is now vacant. This appointment is recognised for the D.A. and will be for 1 year. Remuneration will be at the rate of £670 p.a. and the conditions of service will be in accordance with the terms of service for hospital medical staff in the National Health Service.

Applications should be sent to—

S. HODKINSON, Group Secretary.

Central Offices, Birch Hill Hospital, Rochdale, Lancs.

ROCHDALE. BIRCH HILL HOSPITAL. (General —956 Beds, Obstetrics 58 Beds.) ROCHDALE AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of HOUSE OFFICER (obstetrics and gynæcology) now vacant. The post is for 6 months in the first instance and is recognised for the D.Obst. R.C.O.G.

Applications to Group Secretary, Birch Hill Hospital, Rochdale, at once.

ROCHFORD, ESSEX. GENERAL HOSPITAL. Applications are invited for the post of RESIDENT HOUSE PHYSICIAN (House Officer grade). Post vacant shortly, for a period of 6 months for duties in acute female medical, pædiatric and psychiatric observation wards.

Applications should be sent as soon as possible to—

J. C. FIELD, Secretary.

ROMFORD, ESSEX. RUSH GREEN HOSPITAL. (247 Beds.) Applications are invited from medical registered practitioners for the post of RESIDENT SENIOR HOUSE OFFICER (anæsthetics) at the above Hospital. Good experience in anæsthetics for general surgery, gynæcology, and E.N.T. Over 2200 operations were performed in 1951. Modern equipment.

Applications, stating age, nationality, qualifications with dates, present appointment, and experience, should be forwarded to the Group Secretary, Romford Group Hospital Management Committee, Oldchurch Hospital, Romford, as soon as possible. Applicants may see the Hospital by arrangement with the Medical Superintendent, Telephone No. Romford 7711.

RUGBY. HOSPITAL OF ST. CROSS AND ST. MARY'S HOSPITAL. HOUSE SURGEON for Obstetric (50 Beds) and Gynæcological (12 Beds) Departments. Required 15th November.

Applications, stating age, qualifications and experience, together with copy testimonials, to Hospital Secretary, Hospital of St. Cross, Rugby.

RUGBY. HOSPITAL OF ST. CROSS. House Surgeon for General Surgical Department. Required 1st December.

Applications, stating age, qualifications, together with copy testimonials, to Hospital Secretary, Hospital of St. Cross, Rugby.

SHEFFIELD, 5. CITY GENERAL HOSPITAL. Applications are invited for the resident appointment of HOUSE SURGEON (orthopædics—and certain extra duties).

Applications, giving full details of age, nationality, qualifications, present and previous appointments with dates, and the names of 2 persons to whom reference may be made, should be forwarded to the undersigned at Nether Edge Hospital, Sheffield, 11. W. STANSFIELD, Secretary.

SHEFFIELD. CITY GENERAL HOSPITAL. Applications are invited from suitably qualified medical practitioners for the resident post of SENIOR HOUSE OFFICER to the Thoracic Surgery Unit, vacant 1st January, 1953. Preference will be given to candidates with experience in chest diseases and holding a higher surgical qualification.

Apply, giving full details of age, qualifications, present and previous appointments with dates, and the names of 2 persons to whom reference may be made, to the undersigned at Nether Edge Hospital, Sheffield, 11. W. STANSFIELD, Secretary.

SHEFFIELD. CITY GENERAL HOSPITAL. Department OF OBSTETRICS AND GYNÆCOLOGY. (100 obstetric and 43 gynæcological beds under the care of a full-time Consultant and the Professor of Obstetrics and Gynæcology, University of Sheffield.) Applications are invited for the resident posts of HOUSE SURGEONS (Obstetrics—2 vacancies, 1st January, 1953). The posts are recognised for the M.R.C.O.G. Candidates with previous resident medical or surgical experience preferred.

Apply, giving full details of age, nationality, qualifications, present and previous appointments with dates, and the names of 2 persons for reference, to W. STANSFIELD at Nether Edge Hospital, Sheffield, 11, not later than 14th November, 1952.

SHEFFIELD. CITY GENERAL HOSPITAL. Applications are invited for the resident post of SENIOR HOUSE OFFICER in the Casualty and Orthopædic Department, now vacant.

Apply, giving full details of age, qualifications, present and previous appointments, and the names of 2 persons for reference, to the undersigned at Nether Edge Hospital, Sheffield, 11.

W. STANSFIELD, Secretary.

SHEFFIELD, 6. KING EDWARD VII ORTHOPÆDIC HOSPITAL, Rivelin Valley-road. (140 Beds.) SHEFFIELD REGIONAL HOSPITAL BOARD. SHEFFIELD NO. 3 HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from Male or Female practitioners for the appointment of HOUSE SURGEON or SENIOR HOUSE OFFICER (according to experience), resident or non-resident. The Hospital has at present a complement of 140 Beds, of which 100 are occupied by children. The post would involve a fair amount of medical work as well as orthopædics. Salary £670 p.a., less authorised deductions in respect of residential emoluments.

Applications, stating age, qualifications, and experience, with names of 2 referees, should be addressed to the Group Secretary, Sheffield No. 3 Hospital Management Committee, Lodge Moor Hospital, Sheffield, 10.

SHEFFIELD, 6. MIDDLEWOOD HOSPITAL. (2000 Beds.) Applications are invited from Male or Female Officers for the appointments of JUNIOR HOSPITAL MEDICAL OFFICER and Locum Tenens JUNIOR HOSPITAL MEDICAL OFFICER at Middlewood Mental Hospital. Living-quarters and residential services are available for single Officers and a small furnished flat for a married Officer. Remuneration will be in accordance with the terms and conditions of service issued by the Ministry of Health. There are good facilities for post-graduate study for the D.P.M. and there is full collaboration with the general hospital situate in the same grounds. Excellent laboratory and other special departments. Extensive psychiatric outpatient service.

Applications, stating age, qualifications and experience, together with names and addresses of 2 referees, should be forwarded immediately to the Medical Superintendent, Middlewood Hospital, Sheffield, 6.

R. BRADLEY, Secretary,
Sheffield No. 2 Hospital Management Committee.

SHEFFIELD. THE UNITED SHEFFIELD HOSPITALS. Applications are invited for the following posts :—

(*a*) SENIOR REGISTRAR in Clinical Pathology. A higher qualification is desirable.

(*b*) SENIOR MEDICAL REGISTRAR to the Royal Infirmary Unit. Candidates should preferably be Members of the Royal College of Physicians.

It has been agreed in principle between the Board of Governors of The United Sheffield Hospitals and the Sheffield Regional Hospital Board that the above appointments, if extended to the full period of 4 years, will be divided, if circumstances permit, between The United Sheffield Hospitals and a hospital in the Region. The appointments are for 1 year in the first instance and will be reviewed annually.

Closing date for applications 10th November, 1952.

(*c*) NON-RESIDENT REGISTRAR to the Pædiatric Professorial Unit, Children's Hospital Unit. Closing date for applications, 4th November, 1952.

(*d*) NON-RESIDENT REGISTRAR in Thoracic Surgery, Royal Infirmary Unit. Previous experience in Thoracic Surgery desirable. Post vacant 1st December, 1952. Applications to be sent immediately.

(*e*) NON-RESIDENT SENIOR HOUSE OFFICER in Ophthalmology, Royal Hospital Unit. Applications to be sent immediately.

Applications, stating age, qualifications and experience, with the names of 3 referees, to the Chief Administrative Officer, The United Sheffield Hospitals, West-street, Sheffield, 1.

SHEFFIELD. NETHER EDGE HOSPITAL. Applications are invited from suitably qualified practitioners for the resident post of SENIOR HOUSE OFFICER. Main duties will be in connection with the Maternity Unit but will also be required to assist in the wards for long-stay medical cases.

Applications, giving full details of age, qualifications, present and previous appointments with dates, and the names of 2 persons to whom reference may be made, should be forwarded to W. STANSFIELD at Nether Edge Hospital, Sheffield, 11.

SCUNTHORPE AND DISTRICT WAR MEMORIAL HOSPITAL. SHEFFIELD REGIONAL HOSPITAL BOARD. Applications are invited from registered medical practitioners for the non-resident whole-time post of REGISTRAR (anæsthetics) to the above Hospital, which is recognised for training for the D.A. The appointment is for 1 year in the first instance and may be renewed for a further year.

Applications, giving age, nationality, qualifications, present and previous appointments with dates, together with names and addresses of 3 referees, should be sent to the Secretary, Sheffield Regional Hospital Board, Fulwood House, Old Fulwood-road, Sheffield, 10, to arrive not later than 10th November, 1952.

SALISBURY GENERAL HOSPITAL. Salisbury Group HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of RESIDENT HOUSE SURGEON for a period of 6 months from 28th November, 1952.

Apply, naming 2 referees, to Group Secretary, Odstock Hospital, Salisbury.

SALFORD. HOPE HOSPITAL. Salford Hospital ManageMENT COMMITTEE. Applications are invited for a RESIDENT CLINICAL PATHOLOGIST, on duty alternate nights, Senior House Officer grade. Salary and conditions of service in accordance with the National Health Service Act.

Applications, stating age, qualifications and experience, together with the names of 2 referees, should be addressed to the Superintendent, Hope Hospital, Salford, 6, to arrive as soon as possible after the appearance of this advertisement.

SALFORD. HOPE HOSPITAL. Salford Hospital MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER ANÆSTHETIST required. Salary and conditions of service as laid down by the National Health Service Act. In the theatres about 3000 operations are performed per annum. 2 Consultant Anæsthetists are available. The Hospital is recognised for the Diploma in Anæsthetics examination.

Applications, together with the names of 2 referees, should be forwarded to the Superintendent, Hope Hospital, Salford, 6, as soon as possible.

SCOTLAND. RED CROSS SANATORIA OF SCOTLAND. (156 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER at Tor-na-Dee Sanatorium, near Aberdeen. There is a busy Thoracic Surgical Unit attached to the Sanatorium and the appointment provides an excellent opportunity for experience in the active treatment of pulmonary tuberculosis. Experience in general medicine or surgery is essential. The successful applicant will be expected to take up duty at the end of December, 1952, or early in January, 1953. Salary £650 p.a., less a deduction for board, lodging, and other emoluments provided.

Applications, with the names of 2 referees, should be sent to the Medical Director, Tor-na-Dee, Milltimber, Aberdeenshire, before 22nd November, 1952.

SHOREHAM-BY-SEA, SUSSEX. SOUTHLANDS HOSPITAL. WORTHING GROUP HOSPITAL MANAGEMENT COMMITTEE. HOUSE PHYSICIAN required immediately (additional appointment).

Form of application should be obtained from and returned as soon as possible to, the Surgeon Superintendent, Southlands Hospital. A. V. OAKTON, Group Secretary.

SHREWSBURY. EYE, EAR AND THROAT HOSPITAL. (70 Beds.) SHREWSBURY GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER (E.N.T.) at the Eye, Ear and Throat Hospital, Shrewsbury. Post recognised for the D.L.O. R.C.S. and vacant 1st November, 1952.

Applications, stating age, qualifications, nationality, and experience, together with copies of recent testimonials, should be sent to J. P. MALLETT, Group Secretary.

Royal Salop Infirmary, Shrewsbury, 15th October, 1952.

SOUTHAMPTON EYE HOSPITAL. (32 Beds—recognised for the D.O.M.S.) SOUTHAMPTON GROUP HOSPITAL MANAGEMENT COMMITTEE. RESIDENT SENIOR HOUSE OFFICER required immediately. Salary £670 p.a.

Applications, with copies of testimonials, should be forwarded as soon as possible to the Secretary of the above Committee, Bullar-street, Southampton.

SOUTHAMPTON CHEST HOSPITAL, Thoracic Unit. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the posts of Whole-time SURGICAL REGISTRARS (2 vacancies). This new Unit will ultimately comprise 76 surgical beds and will deal with all types of thoracic surgical cases. Previous experience in thoracic surgery not essential, but candidates must have had general surgery experience. Candidates are invited to visit the Unit if they so desire.

Forms of application may be obtained from the undersigned, to whom they should be returned, when completed, as soon as possible. FRANK JENNINGS, Group Secretary,
Southampton Group Hospital Management Committee.
Bullar-street, Southampton.

SOUTHAMPTON. ROYAL SOUTH HANTS HOSPITAL. (280 Beds.) ORTHOPÆDIC HOUSE SURGEON required. Post tenable 6 months. This Hospital is the centre to which all trauma from a large industrial town and port is directed, thus providing excellent experience in the treatment of traumatic conditions ; patients with orthopædic conditions are also drawn from a wide area.

Applications, with copies of testimonials, should be sent as soon as possible to the Group Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

SOUTHAMPTON. ROYAL SOUTH HANTS HOSPITAL. (280 Beds.) CASUALTY OFFICER (Senior House Officer grading) required immediately.

Applications, with copies of testimonials, to be submitted as soon as possible to the Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

SOUTHEND-ON-SEA. GENERAL HOSPITAL. Required, SENIOR HOUSE OFFICER (surgical). Post vacant 1st December, 1952. Salary £670 p.a. less deduction for full residential emoluments.

Applications, stating age, qualifications, and experience, with copies of recent testimonials, to reach the undersigned by 5th November, 1952. J. C. FIELD, Secretary.

SOUTHEND GENERAL HOSPITAL. Applications are invited for the post of RESIDENT HOUSE SURGEON (House Officer grade), now vacant, for a period of 6 months for general surgical duties, including certain duties in the Orthopædic and Fracture Department.

Applications, &c., to reach the undersigned at the Hospital as soon as possible. J. C. FIELD, Secretary.

STOKE-ON-TRENT. NORTH STAFFS ROYAL INFIRMARY. STOKE-ON-TRENT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of HOUSE OFFICER (medical and dermatological).

Apply, with copy testimonials, stating age, nationality, and full details of previous service, to the Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. NORTH STAFFS ROYAL INFIRMARY. STOKE-ON-TRENT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER (ophthalmics).

Apply with copy testimonials, stating age, nationality, and full details of previous service, to the Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. NORTH STAFFS ROYAL INFIRMARY. STOKE-ON-TRENT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER (E.N.T.).

Apply with copy testimonials, stating age, nationality, and full details of previous service, to the Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. NORTH STAFFS ROYAL INFIRMARY. STOKE-ON-TRENT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of HOUSE OFFICER (surgical).

Apply with copy testimonials, stating age, nationality, and full details of previous service, to the Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. CITY GENERAL HOSPITAL. (944 Beds—Recognised for D.A.) STOKE-ON-TRENT HOSPITAL MANAGEMENT COMMITTEE. Applications invited for post of SENIOR HOUSE OFFICER (anæsthetics) vacant now (Senior Registrar in anæsthetics sharing in emergency duties). Obstetrical Department (104 Beds) work also includes thoracic, genito-urinary and general surgery.

Applications, stating age, nationality, and full details of previous appointments, together with 3 recent testimonials, to be forwarded to the Group Secretary, Stoke-on-Trent Hospital Management Committee.

STOKE-ON-TRENT. BUCKNALL ISOLATION HOSPITAL. STOKE-ON-TRENT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER (medical) vacant now.

Applications, with copy testimonials and details of previous appointments held, should be forwarded to the Group Secretary, Stoke-on-Trent Hospital Management Committee, Princes-road, Stoke-on-Trent, as soon as possible.

ST. ALBANS CITY HOSPITAL. (425 Beds.) Mid Herts GROUP HOSPITAL MANAGEMENT COMMITTEE. JUNIOR HOSPITAL MEDICAL OFFICER required for duties mainly at St. Albans City Hospital (Osterhills Wing) for gynæcological and obstetric work. Post vacant about 24th November, 1952, and tenable for 1 year. Hospital recognised for D.Obst. R.C.O.G.

Applications, giving age, qualifications, and experience, together with the names of 2 referees, should be forwarded to the Group Secretary, Osterhills, Normandy-road, St. Albans, Herts.

ST. ALBANS CITY HOSPITAL. (425 Beds.) Mid Herts GROUP HOSPITAL MANAGEMENT COMMITTEE. HOUSE PHYSICIAN (House Officer grade) required for 1 of the 2 medical teams. Post vacant about 15th November, 1952, and tenable for 6 months.

Applications, together with the names of 2 referees, should be forwarded to the Group Secretary, Osterhills, Normandy-road, St. Albans, Herts.

ST. ALBANS CITY HOSPITAL. (425 Beds.) Mid Herts GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners for the post of HOUSE PHYSICIAN (House Officer grade) at the above Hospital. Post vacant about 11th December, 1952, and tenable for 6 months. The duties will be mainly in the Pædiatric Department, but there will also be some duties in the general medical department.

Applications, stating age, and experience, together with copies of recent testimonials, to be forwarded to the Group Secretary, Osterhills, Normandy-road, St. Albans.

SWINDON HOSPITALS. (500 Beds.) Swindon and DISTRICT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners for the post of RESIDENT HOUSE PHYSICIAN in Acute Medical Unit of 64 Beds at St. Margaret's Hospital.

Full details, together with copies of 3 recent testimonials, to Secretary, 7, Okus-road, Swindon, Wilts, as soon as possible.

SWANSEA. HILL HOUSE ISOLATION HOSPITAL, SKETTY, SWANSEA. (118 Beds.) GLANTAWE HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners (Female) for the resident appointment of JUNIOR HOSPITAL MEDICAL OFFICER. The Hospital is the centre for streptomycin treatment of tuberculous meningitis.

Applications, stating age, qualifications, and experience, should be forwarded to—

O. C. HOWELLS, Secretary,
Glantawe Hospital Management Committee.
St. Helen's-road, Swansea.

SWANSEA HOSPITAL. (403 Beds.) Glantawe Hospital MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners for the resident appointment of HOUSE SURGEON.

Full particulars of age, qualifications, and experience, should be forwarded to— O. C. HOWELLS, Secretary,
Glantawe Hospital Management Committee.
Swansea Hospital, St. Helen's-road, Swansea.

SWANSEA HOSPITAL. (403 Beds.) Glantawe Hospital MANAGEMENT COMMITTEE. Registered medical practitioners are invited to apply for the non-resident appointment of SENIOR HOUSE OFFICER in the Ophthalmic Department of Swansea Hospital. The post is recognised for the F.R.C.S. (Eng.) and D.O. examinations.

Applications, stating age, qualifications, and experience, should be addressed to—

O. C. HOWELLS, Secretary,
Glantawe Hospital Management Committee.
St. Helen's-road, Swansea.

SUTTON. BELMONT HOSPITAL. South West Metro-POLITAN REGIONAL HOSPITAL BOARD. ST. EBBA'S AND BELMONT GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for appointment as REGISTRAR at above Hospital, which is principally concerned with the treatment of neuroses and the early psychoses. There are ample opportunities for research, and the Hospital, which is recognised for the D.P.M., takes an active part in teaching in association with teaching Hospitals. Candidates may visit the Hospital by appointment.

Application forms may be obtained by sending a stamped addressed envelope to the Group Secretary, Group Office, Belmont Hospital, Brighton-road, Sutton, Surrey, and completed forms (5 copies) should be returned to him within 2 weeks of the appearance of this advertisement.

SULLY HOSPITAL, Sully, Glam. Major Thoracic Centre. (324 Beds.) CARDIFF HOSPITAL MANAGEMENT COMMITTEE. HOUSE OFFICER required, experience gained in medical and surgical treatment of all chest diseases in adults and children.

Applications, with names and addresses of 2 referees, within 2 weeks of appearance of advertisement to the Physician-Superintendent.

TAUNTON AND SOMERSET HOSPITAL. (Musgrove Park Branch and East Reach Branch.) TAUNTON HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners for the post of HOUSE SURGEON (casualty and orthopædic). The post is recognised by the Royal College of Surgeons as a qualifying appointment for the Final Fellowship examination.

Applications, stating age, qualifications with dates, nationality, details of experience, together with 2 recent testimonials, to be sent immediately to the Secretary, Musgrove Park Hospital, Taunton, Somerset.

TAUNTON AND SOMERSET HOSPITAL. (Musgrove Park Branch and East Reach Branch.) TAUNTON HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners for the post of HOUSE SURGEON (general surgery). Salary in accordance with the National Health Service scale. The post is recognised by the Royal College of Surgeons as a qualifying appointment for the Final Fellowship examination.

Applications, stating age, qualifications with dates, nationality, and details of experience, together with 2 recent testimonials, should be sent immediately to the Secretary, Taunton Hospital Management Committee, Musgrove Park Hospital, Taunton, Somerset.

TAUNTON AND SOMERSET HOSPITAL. (Musgrove Park Branch and East Reach Branch.) TAUNTON HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners for the post of HOUSE SURGEON (casualty and E.N.T.). The post is recognised by the Royal College of Surgeons as a qualifying appointment for the Final Fellowship examination.

Applications, stating age, qualifications with dates, nationality, details of experience, together with 2 recent testimonials, to be sent immediately to the Secretary, Musgrove Park Hospital, Taunton, Somerset.

TAPLOW, near MAIDENHEAD. CANADIAN RED CROSS MEMORIAL HOSPITAL. HOUSE SURGEON required for post vacant 24th December. Post recognised for F.R.C.S. Salary on national scale.

Applications, stating age, experience, and qualifications with dates, together with copies of 2 testimonials, should be sent to the Hospital Secretary, by 7th November.

TRURO. ROYAL CORNWALL INFIRMARY. (General Hospital—212 Beds ; 8 Residents.) WEST CORNWALL HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of RESIDENT ANÆSTHETIST (Senior House Officer status), which is now vacant. Post tenable for 1 year.

Applications, stating age, nationality, qualifications and experience, and enclosing copies of 2 recent testimonials, should be forwarded to the Hospital Secretary, Royal Cornwall Infirmary, Truro.

TRURO. ROYAL CORNWALL INFIRMARY. (General Hospital—212 Beds ; 8 Residents.) WEST CORNWALL HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the 2 vacant posts of SENIOR RESIDENT HOUSE OFFICER to the Orthopædic and Traumatic Department which fall vacant on 26th October and 6th December, 1952, respectively. This is a large and busy centralised Unit with 2 Consultants, 64 Beds, and Outpatients Departments which deal with the whole of the West Cornwall Area. The posts are tenable for 1 year.

Applications, stating age, nationality, qualifications, and experience, and accompanied by copies of 2 recent testimonials, should be forwarded to the Hospital Secretary, Royal Cornwall Infirmary, Truro, without delay.

UXBRIDGE CHEST CLINIC, High-street, Uxbridge, MIDDLESEX. NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Whole-time TUBERCULOSIS REGISTRAR required at above Clinic. Duties will include work in the Chest Clinic and at Hillingdon Hospital, Uxbridge. Good experience in general medicine essential and some experience in tuberculosis desirable. Clinic may be visited by direct appointment.

Application forms obtainable from, and returnable to, Group Secretary, Uxbridge Group Hospital Management Committee, St. John's Hospital, Kingston-lane, Uxbridge, Middlesex, by 10th November.

WELSH REGIONAL HOSPITAL BOARD. Applications are invited from registered medical practitioners for the non-resident post of REGISTRAR in General Medicine at the Caernarvon and Anglesey General Hospital, Bangor. The successful candidate will be based at the above Hospital but will be expected to visit other hospitals in the Area. The post will be subject to review at the end of the first year.

Forms of application should be obtained from the Senior Administrative Medical Officer, Welsh Regional Hospital Board, Cathays Park, Cardiff, within 14 days of appearance of this advertisement.

WELSH REGIONAL HOSPITAL BOARD. Applications are invited from registered medical practitioners for the appointment of a REGISTRAR in Psychiatry at Hensol Castle Mental Deficiency Institution, Pontyclun. The Hospital provides all modern methods of training and treatment and accommodates approximately 560 patients. The post will be subject to review at the end of the first year. Accommodation is available.

Forms of application should be obtained from the Senior Administrative Medical Officer, Welsh Regional Hospital Board, Cathays Park, Cardiff, within 14 days of appearance of this advertisement.

WELSH REGIONAL HOSPITAL BOARD. Applications are invited from registered medical practitioners for the appointment of a REGISTRAR in General Surgery to serve the Mid-Glamorgan Hospital Management Committee. The successful candidate will be based at Neath General Hospital (412 Beds), and will also be expected to serve other hospitals in the Group. The post may be resident or non-resident and will be subject to review at the end of the first year.

Forms of application should be obtained immediately from the Senior Administrative Medical Officer, Welsh Regional Hospital Board, Cathays Park, Cardiff.

WELSH REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of a REGISTRAR in Infectious Diseases to serve the Cardiff Hospital Management Committee. The successful candidate will be based at the City Isolation Hospital, Cardiff (219 Beds). The post is resident and will be subject to review at the end of the first year.

Forms of application should be obtained from the Senior Administrative Medical Officer, Welsh Regional Hospital Board, Cathays Park, Cardiff, within 14 days of appearance of this advertisement.

WAKEFIELD. THE GENERAL HOSPITAL, Park Lodge-lane. (160 Beds.) HOSPITAL MANAGEMENT COMMITTEE NO. 9 WAKEFIELD A GROUP. Applications are invited for the appointment of a SENIOR HOUSE OFFICER in General Surgery at the above Hospital. Terms and conditions of service are in accordance with the National Health Service Act and Regulations thereunder.

Applications should be made to the Medical Superintendent.

WARRINGTON GENERAL HOSPITAL. (368 Beds.) Applications are invited for RESIDENT HOUSE PHYSICIAN (Male or Female). The salary scale is £350–£450 p.a., less a deduction of £100 for residential emoluments. The appointment offers a wide and comprehensive experience in general medicine, including acute medical, paediatric and infectious diseases. Staffing of the Medical Unit consists of a Registrar, Paediatric Senior House Officer and 2 House Physicians.

Applications should be forwarded to—

H. L. BOOT, Group Secretary,
Warrington and District Hospital Management Committee,
c/o General Hospital, Warrington, Lancs.

WARRINGTON INFIRMARY. (172 Beds.) Applications are invited for a vacancy at the above Hospital for a RESIDENT HOUSE SURGEON. Salary will be £350–£450 p.a., less a deduction of £100 for full residential emoluments.

Applications should be sent to—

H. L. BOOT, Secretary,
Warrington and District Hospital Management Committee,
c/o General Hospital, Warrington, Lancs.

WOKING VICTORIA HOSPITAL, Woking, Surrey. (72 Beds.) HOUSE OFFICER (surgical and medical duties) required. Resident preferred, non-resident considered. Salary and conditions of service as laid down by Ministry of Health.

Apply, with testimonials, to Assistant Secretary.

WORKSOP, NOTTS. VICTORIA HOSPITAL. (127 surgical beds.) HOUSE SURGEON required immediately, duties include Orthopædic and E.N.T. Departments. Appointment for 6 months in first instance. Salary £350–£450 according to experience, less deduction of £100 p.a. residential emoluments.

Applications, stating age, qualifications, nationality, together with copies of recent testimonials, to be forwarded to the Secretary, Worksop and Retford Hospital Management Committee, Victoria Hospital, Worksop, Notts.

WORCESTER ROYAL INFIRMARY. (277 Beds.) Applications are invited for the post of HOUSE PHYSICIAN which becomes vacant on 1st December. The appointment will be for 6 months and the salary will be in accordance with the terms and conditions of service laid down for hospital medical staff.

Applications, with copies of testimonials, should be sent to the Secretary by not later than 5th November, 1952.

WORTHING GROUP HOSPITAL MANAGEMENT COMMITTEE. WORTHING HOSPITAL (221 Beds). COURTLANDS RECOVERY HOSPITAL (52 Beds). Applications are invited for the post of HOUSE SURGEON for Special Departments. New appointment. R practitioners within 3 months of qualification, or holding a first post may apply. Salary £350–£450, less a deduction of £100 p.a. for residential emoluments. Accommodation available for male or female staff.

Apply Hospital Secretary, Worthing Hospital, Lyndhurst-road, stating age, qualifications with dates, nationality, and details of experience, together with copies of 2 recent testimonials. A. V. OAKTON, Group Secretary,
Worthing Group Hospital Management Committee.
129, Brighton-road, Worthing.

WINCHESTER. ROYAL HAMPSHIRE COUNTY HOS-PITAL. HOUSE PHYSICIAN to Maternity Department, vacant 26th November. Hospital is recognised by the Royal College.

Applications, with copies of 2 testimonials, should be sent to the Secretary.

WINCHESTER. ROYAL HAMPSHIRE COUNTY HOS-PITAL. HOUSE SURGEON to the Senior Surgeon. Vacant 26th November.

Applications, with copies of 2 testimonials, should be sent to the Secretary.

WINDSOR. KING EDWARD VII HOSPITAL. House PHYSICIAN (Male or Female) required. Post vacant 1st December. Salary on national scale.

Applications, stating age, nationality, experience, and qualifications with dates, together with copies of 3 testimonials, or the names of 3 referees, should be sent to the Hospital Secretary.

WHISTON. COUNTY HOSPITAL. (882 Beds.) Applications are invited from suitably qualified practitioners for the appointment of RESIDENT SENIOR HOUSE OFFICER (obstetrics and gynæcology). Salary £670 p.a., in accordance with the terms and conditions of service for medical staff, subject to a deduction of £130 p.a. for residential emoluments. The post is recognised for the M.R.C.O.G. and D.Obst.R.C.O.G. examination.

Applications, stating age, qualifications, and experience, and giving 2 names for reference, should be forwarded to the undersigned as soon as possible.

N. RICHARDS, Secretary,
St. Helens and District Hospital Management Committee.
Group Office, County Hospital, Whiston, near Prescot.

WILLESBOROUGH HOSPITAL, near Ashford, Kent. SOUTH EAST KENT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of HOUSE SURGEON at the above Hospital. Good experience in general surgery with some casualty work. Salary £350, £400, or £450 a year, less £100 a year for residential emoluments.

Applications, stating age, qualifications, and the names and addresses of 2 referees, should be forwarded to the Group Secretary, "Ash-Eton," Radnor Park West, Folkestone.

WILLESBOROUGH HOSPITAL, near Ashford, Kent. SOUTH EAST KENT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of RESIDENT HOUSE SURGEON (obstetric and gynæcological) at the above Hospital. The appointment is recognised for the D.Obst.R.C.O.G. and will be tenable for a period of 6 months. Salary £350, £400 or £450 a year according to experience. A deduction of £100 a year will be made in respect of residential emoluments.

Applications, stating age, qualifications, experience, and the names and addresses of 2 referees, should be addressed to the Group Secretary, "Ash-Eton," Radnor Park West, Folkestone, Kent.

WREXHAM. MAELOR GENERAL HOSPITAL. (513 Beds.) WREXHAM, POWYS, AND MAWDDACH HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of HOUSE SURGEON at the above Hospital, to commence immediately. The appointment is recognised for the Diploma of F.R.C.S. (Eng. and Edin.). Salary will be at the rate of £350, £400, or £450 p.a., according to experience, less £100 p.a. for full residential emoluments.

Applications, stating age, nationality, qualifications, and experience, together with copies of 2 recent testimonials, should be addressed to—

WILLIAM JONES, Secretary, Wrexham,
Powys, and Mawddach Hospital Management Committee.
Maelor General Hospital, Croesnewydd-road, Wrexham.

WREXHAM. WAR MEMORIAL HOSPITAL. (170 Beds.) WREXHAM, POWYS, AND MAWDDACH HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of HOUSE SURGEON at the above Hospital, to commence immediately. Salary will be at the rate of £350, £400 or £450 p.a. according to experience, less £100 p.a. for full residential emoluments.

Applications, stating age, nationality, qualifications, and experience, together with copies of 2 recent testimonials, should be addressed to—

WILLIAM JONES, Secretary, Wrexham,
Powys, and Mawddach Hospital Management Committee.
Maelor General Hospital, Croesnewydd-road, Wrexham.

NEW ZEALAND. AUCKLAND HOSPITAL BOARD. Applications are invited from qualified medical practitioners for the post of JUNIOR or SENIOR SURGICAL REGISTRAR to the Cardiosurgical and Thoracic Surgical Units, Green Lane Hospital, Auckland, New Zealand. Applicants must be eligible to qualify as either a "Junior" or "Senior Registrar" as defined in the conditions of appointment. Salary scale "Junior Registrar" £840 13s.–£898 3s. p.a. by 1 annual increment of £57 10s. "Senior Registrar" £955 13s.–£1070 13s. p.a. by 2 annual increments of £57 10s. Commencing salary within scale according to seniority. Accommodation is not provided. Fares not payable by Board. Conditions of appointment and form of application obtainable from the office of the High Commissioner for New Zealand, 415, Strand, London, W.C.2.

Applications close with the undersigned at the office of the Board, Kitchener-street, Auckland, New Zealand, at NOON on Tuesday, 2nd December, 1952.

R. F. GALBRAITH, Secretary.

NEWFOUNDLAND. ST. JOHN'S GENERAL HOS-PITAL. DEPARTMENT OF HEALTH, NEWFOUNDLAND. Applications are invited from registered medical practitioners for the post of INTERN at the above Hospital. 1 years rotating Internship is provided in medicine, surgery, obstetrics, &c., with salary at the rate of $1800 p.a., with full maintenance. The Hospital is recognised by the American College of Surgeons and the Canadian Medical Council for Intern training. On the understanding that Interns will complete 1 years satisfactory service, the Department of Health will pay the cost of transportation to St. John's and return to the United Kingdom.

Applications, with full details, should be forwarded to the Medical Superintendent, St. John's General Hospital, St. John's, Newfoundland.

NEW YORK CITY. State University of New York College of Medicine at New York City in affiliation with Kings County Hospital now offers a 2-year RESIDENCY in Anesthesiology.

For further information write to MEREL H. HARMEL, M.D.
Kings County Hospital, 451, Clarkson-avenue,
Brooklyn, N.Y.

NEW YORK. ALBANY HOSPITAL. Internships and RESIDENCIES available in 750-Bed general, private Albany Hospital, directly connected to Albany Medical College. Approved for all major specialties and accepted by the State Department as member of Exchange Visitor Program. Salary range $300–$1400 annually in addition to food, laundry, uniforms and rooms. All appointments begin 1st July, 1953.

For further information apply to Administrative Office, Albany Hospital, Albany, New York.

NEW YORK. ROCHESTER GENERAL HOSPITAL, ROCHESTER, 8, NEW YORK. Approved INTERNSHIPS and RESIDENCIES in Specialties available for this year and next year.

Address : Director of Medical Education.

SOUTH AFRICA. PROVINCIAL ADMINISTRATION OF THE CAPE OF GOOD HOPE. HOSPITALS DEPARTMENT. Applications are invited for appointment to the post of MEDICAL PRACTITIONER, Grade C, with salary on the scale £1000–£50–£1200 p.a. on the fixed establishment of the Victoria Hospital, Lovedale, Cape Province, South Africa.

(2) In addition to the scale of salary indicated, cost-of-living allowance at rates prescribed from time to time by the Administrator is payable to whole-time officials and employees (at present £100 p.a. for single persons, and £320 p.a. for married).

(3) The conditions of service are prescribed in terms of the Hospital Board Service Ordinance No. 19 of 1941, as amended, and the regulations framed thereunder.

(4) The duties attaching to the post are essentially the care of medical patients, but the successful applicant will be required to accept responsibility for the care of surgical cases should the Surgeon not be available.

(5) The minimum requirements for the post are 5 years practice since graduation, of which 3 must have been mainly in the practice of medicine.

(6) The successful candidate, if not already in the Hospital Board Service, will be required to submit satisfactory birth and health certificates.

(7) Applications must be made on the prescribed form Staff 23, obtainable from the Medical Superintendent. The completed forms, along with copies of 2 recent testimonials, should be addressed as soon as possible to the Medical Superintendent, Victoria Hospital, Lovedale, Cape Province, South Africa, from whom further information may be obtained.

Public Appointments

ANTRIM COUNTY HEALTH COMMITTEE. Northern IRELAND. Applications are invited from registered medical practitioners holding a Diploma in Sanitary Science, Public Health, or State Medicine, for the following posts :—

(*a*) MEDICAL OFFICER in charge of No. II Divisional Area of County Antrim to act as Assistant County Medical Officer and also as Medical Officer of Health within No. II Divisional Area, comprising Ballymena Borough and Ballymena Rural District (combined population 46,610 approximately).

(*b*) MEDICAL OFFICER in charge of No. III Divisional Area of County Antrim to act as Assistant County Medical Officer and also as Medical Officer of Health within No. III Divisional Area, comprising Larne Borough, Carrickfergus Borough and Whitehead Urban and Larne Rural Districts (combined population 41,873 approximately).

Salary for posts (*a*) and (*b*) on the scale £1300–£50–£1700 p.a. as approved by the Ministry of Health and Local Government. The title, status, and responsibilities of the posts are, however, subject to further consideration by the Health Committee.

(*c*) ASSISTANT COUNTY MEDICAL OFFICER to carry out duties in connection with the Maternity and Child Welfare Service, Schools Medical Service, and other general health functions under the direction of the County Medical Officer.

Salary for post (*c*) on the scale £850–£50–£1150 p.a.

Applicants for the 3 posts must be qualified in accordance with the Qualifications and Duties of Medical Officers' Regulations, S.R. & O. (N.I.) 1948, no. 26. The persons appointed will each be expected to provide a car for official duty, and will be granted a travelling allowance in accordance with the scale in force for the time being. The posts are subject to the Local Government Superannuation Act (N.I.) 1950. Regulations have provided for credit to be given within the Northern Ireland Scheme for service reckonable under approved superannuation schemes in Great Britain. It is the Committee's policy to give special consideration to applicants who have served in Her Majesty's Forces.

Application forms and full particulars may be obtained from the Secretary at Rosstulla, Jordanstown, County Antrim. Applications must be lodged with the Secretary at or before NOON on Saturday, 22nd November, 1952.

S. PENNINGTON, Secretary.

KENT EDUCATION COMMITTEE. Applications are invited for the appointment of ASSISTANT COUNTY MEDICAL OFFICER (Male or Female) in the North West Kent Area. The salary scale is £850 a year, with annual increments of £50, to £1150 a year. The commencing salary will be fixed at a point on the scale according to the experience and qualifications of the successful candidate. The appointment is superannuable and the successful candidate will be required to pass a medical examination. The duties are mainly in the School Health and Child Welfare Services, and experience in the classification of educationally subnormal children will be an advantage.

Applications, stating age, qualifications, and experience, accompanied by the names and addresses of 2 persons to whom reference may be made as to professional ability and character, should be addressed to the County Medical Officer, County Hall, Maidstone, not later than 13th November, 1952.

A. ELLIOTT, M.D., School Medical Officer.

County Hall, Maidstone, October, 1952.

BIRMINGHAM. CITY OF BIRMINGHAM. Public HEALTH DEPARTMENT. Whole-time SENIOR DENTAL OFFICER for Maternity and Child Welfare. Duties will be concerned with dental inspection and treatment of expectant and nursing mothers, and young children up to the age of 5 years. Salary £1250–£50–£1550 p.a. with placement on the scale according to experience, up to a maximum of 5 years. Pension scheme (including Widows and Orphans), medical examination.

Applications, stating qualifications and experience, with names of 3 referees, to be sent to the Medical Officer of Health, Council House, Birmingham, 3, not later than 17th November, 1952.

CROYDON. COUNTY BOROUGH OF CROYDON. Applications are invited for the established appointment of ASSISTANT MEDICAL OFFICER OF HEALTH AND ASSISTANT SCHOOL MEDICAL OFFICER from registered medical practitioners, with at least 3 years experience after qualification, for duties mainly in the School Health and Maternity and Child Welfare Services. D.P.H. or D.C.H. will be an advantage. Salary within the scale £850–£50–£1150 p.a. No living accommodation is offered.

Applications on forms from the Medical Officer of Health, 45, Wellesley-road, Croydon, must be submitted to him by 17th November, 1952. Canvassing will disqualify.

E. TABERNER, Town Clerk.

EDINBURGH. CITY OF EDINBURGH Public Health DEPARTMENT. Applications are invited for the post of ASSISTANT MEDICAL OFFICER (Male or Female) in the Maternity and Child Welfare Service of the City of Edinburgh. Possession by applicants of the Diploma in Public Health or the Diploma in Child Health will be an added qualification. The salary scale is £850–£50–£1150 with placing according to experience in local authority service. The successful candidate will require to undergo a medical examination and to become a contributor to the Corporation's Superannuation Scheme.

Applications, giving age, qualifications and experience, and the names of 3 referees, should be sent to the Medical Officer of Health, Johnston-terrace, Edinburgh, 1, not later than 8th November, 1952.

FACTORY DOCTORS : Factories Acts, 1937 and 1948. The following appointments as Appointed Factory Doctor under the Factories Acts, 1937 and 1948, are vacant. Applications should be sent to the Chief Inspector of Factories, 8, St. James's-square, London, S.W.1.

District	*County*	*Latest date for receipt of application*
WESTRAY ..	.. ORKNEY	.. 15TH NOVEMBER, 1952
PORTREE ..	.. INVERNESS	.. 15TH NOVEMBER, 1952
SHEFFIELD EAST ..	YORK .. .	.. 15TH NOVEMBER, 1952

GATESHEAD. COUNTY BOROUGH OF GATESHEAD. Applications are invited from duly qualified men in possession of the D.P.H., C.P.H., or D.C.H. for the post of ASSISTANT MEDICAL OFFICER OF HEALTH AND ASSISTANT SCHOOL MEDICAL OFFICER in the Public Health Department. Salary will be within the scale commencing £850 and rising to £1150 p.a., by annual increments of £50, having regard to the experience of the candidate in similar posts. The appointment is superannuable, subject to medical examination, and is terminable by 1 months notice from either side.

A list of the duties of the office may be obtained from the Medical Officer of Health, Greenesfield House, Mulgrave-terrace, Gateshead, to whom applications, stating age and experience, and accompanied by not more than 3 recent testimonials, should be sent in envelopes endorsed "Assistant Medical Officer," not later than 15th November, 1952. Candidates are requested to state whether they are related to any member of the Council or Senior Officer employed by this Corporation.

20th October, 1952. J. W. PORTER, Town Clerk.

JARROW. UNITED DISTRICTS OF THE BOROUGH OF JARROW AND THE URBAN DISTRICTS OF HEBBURN AND FELLING. (Aggregate population—76,890.) The Joint Committee of the above invite applications from medical practitioners possessing the requisite qualifications and experience for the appointment of MEDICAL OFFICER OF HEALTH for the above United Districts at a salary of £1650 p.a., rising by annual increments of £50 to a maximum of £1900, which includes the sum of £100 p.a. for the joint appointment. Applicants must possess a Diploma in Public Health or a similar qualification and should possess experience in the administration of Public Health Services. The person appointed will be required to devote his whole time to the duties of such offices and will not be allowed to engage in private practice. Particulars of the appointment and forms of application are obtainable from the undersigned.

Applications, endorsed "Medical Officer of Health," addressed to the undersigned at the Town Hall, Jarrow, must be received not later than Saturday, 29th November, 1952. Canvassing directly or indirectly will disqualify the applicants, and candidates must disclose in writing whether they are related to any member or senior officer of any of the above Councils.

M. L. ROTHFIELD, Town Clerk of Jarrow.
Clerk to the Joint Committee.

Town Hall, Jarrow, 23rd October, 1952.

NATIONAL COAL BOARD. North-Western Division. Applications are invited for the post of MEDICAL OFFICER to the No. 1 (Manchester) Area. The work will include making underground visits at collieries. Candidates should have experience in the field of preventive and industrial medicine ; knowledge of the coal-mining industry would be an advantage. Salary will be according to qualifications and experience, within the range of £1250–£1900 p.a.

Applications, giving age, education, qualifications, experience, present appointment and salary, together with the names of 2 referees, should be sent to the Divisional Establishment Officer, National Coal Board, North-Western Division, 40, Portland-street, Manchester, 1, within 14 days from the date of this advertisement.

NATIONAL COAL BOARD. North-Eastern Division. Applications are invited for the post of MEDICAL OFFICER in the Barnsley Area of the North-Eastern Division. Candidates should have experience in the field of preventive and industrial medicine and a knowledge of the Coal-mining Industry will be an advantage. The work will include making underground visits to collieries. Salary, according to qualifications and experience, will be within the range of £1250–£1900.

Detailed applications, giving the names of all referees, should be sent to the Divisional Establishments Officer, National Coal Board, North-Eastern Division, Ranmoor Hall, Belgrave-road, Sheffield, 10, to arrive not later than 17th November, 1952.

HER MAJESTY'S COLONIAL SERVICE. British Guiana. ASSISTANT SURGEON required. Duties: to assist in surgical work, including gynæcology, in the Public Hospital, Georgetown, the obstetrical wards and antenatal clinics of which will be under his care; to perform such surgical and other duties in the public hospitals as the Director of Medical Services may direct; to instruct Junior Medical Officers and Nurses in surgery and obstetrics. Appointment will be on 3 years probation for permanent and pensionable employment or on agreement for 2–3 years. Candidates in the National Health Service may resign from the National Health Service but retain their superannuation rights while serving in British Guiana (up to 6 years) and thereafter receive a resettlement grant of 20% of the aggregate of their Colonial salary. Salary scale £1000–£50–£1200 p.a. plus Specialist allowance of £150 p.a. Private practice is not allowed but 50% of consultation fees are payable to the Officer. Free unfurnished quarters provided. Taxation at local rates. Free passages on appointment for Officer and family, not exceeding 5 persons in all, and up to £200 for Officer only on leave. Local leave permissible and generous home leave granted after each tour of from 2 years. Candidates must hold degrees or diplomas in medicine and surgery registrable in United Kingdom and be Fellows of 1 of the Royal Colleges of Surgeons: a higher qualification in gynæcology and obstetrics is desirable. They should have held resident surgical appointments in a general hospital for at least 2 years.

Application forms from Director of Recruitment (Colonial Service), Colonial Office, Sanctuary Buildings, Great Smith-street, London, S.W.1 (quoting reference No. CSE. 60/30/02).

HER MAJESTY'S COLONIAL SERVICE. Kenya. Medical OFFICERS required for general duties. Permanent appointments with non-contributory pension at age 55, or short-term contracts with gratuity on satisfactory completion of service. Salary scale from £865 to £1590 p.a.; starting point determined by age, experience and war service. Temporary cost-of-living allowance of 25% of salary, subject to maximum of £250 p.a. also payable. Quarters provided at rental of 10% of salary. Free passages in both directions for Officer and wife and up to cost of 1 adult fare for children. Taxation at local rates. Annual local leave permissible and generous home leave granted after each tour of from 40 to 48 months. Social amenities good. Educational facilities available for children. Medical Officers are eligible for promotion to administrative super-scale posts in Kenya and other colonial territories and also, on acquiring specialist qualifications and experience, for specialist appointments. Candidates must possess medical qualifications registrable in the United Kingdom and at least 1 years postgraduate hospital experience.

Application forms from Director of Recruitment (Colonial Service), Colonial Office, Sanctuary Buildings, Great Smith-street, London, S.W.1 (quoting ref. No. CSE. 60/7/02).

STOKE-ON-TRENT. CITY OF STOKE-ON-TRENT EDUCATION COMMITTEE. Applications are invited from fully qualified and registered medical practitioners for the post of Whole-time ASSISTANT SCHOOL MEDICAL OFFICER. Salary scale £850–£1150 p.a. by annual increments of £50. The duties will consist of routine medical inspections in schools and clinic work. Experience in refraction work is desirable. The appointment is subject to the provisions of the National Health Service superannuation regulations and is terminable by 1 months notice on either side. The successful candidate will be required to pass a medical examination.

Form of application, which may be obtained from the undersigned, should be completed and returned as soon as possible.

H. DIBDEN, Chief Education Officer.

Town Hall, Hanley, Stoke-on-Trent.

MANCHESTER. CITY OF MANCHESTER. Health DEPARTMENT. Applications are invited from duly registered medical practitioners (Men or Women), who hold a Diploma in Public Health, or equivalent qualification, for the position of SENIOR MEDICAL OFFICER in the Nursing Services Division of the Health Department. Administrative experience is essential. The salary scale is £1250, rising by annual increments of £50, to £1650 p.a. and the appointment is subject to the regulations and conditions of service approved by the City Council.

Full particulars of the appointment and forms of application may be obtained from the Town Clerk, Town Hall, Manchester, 2, to whom completed applications must be submitted not later than Saturday, 8th November, 1952, endorsed "Senior Medical Officer—Nursing Services." Canvassing in any form is prohibited.

NORTHUMBERLAND COUNTY COUNCIL. The Children's Committee wish to appoint a CONSULTANT PÆDIATRICIAN to give advice concerning certain of the children placed in the Committee's care, upon the medical aspects of the conduct of children's homes, boarding out and other questions which the Committee may from time to time raise. Applicants should be experienced Pædiatricians and interested in the social and medical problems of the "deprived" child. It is expected that the work will be equivalent to an average of 1 session weekly, and will be paid at the rate of £250 p.a.

Further details may be obtained from the Children's Officer, 12, City-road, Newcastle upon Tyne, 1, to whom applications should be sent by 8th November, 1952.

E. P. HARVEY, Clerk of the County Council.

NORTHAMPTON COUNTY BOROUGH. Assistant MEDICAL OFFICER OF HEALTH AND ASSISTANT SCHOOL MEDICAL OFFICER. Salary £850–£50–£1150 p.a.

Particulars of the above appointment and form of application, to be returned by 29th November, may be obtained from the Medical Officer of Health, 7A, St. Giles'-square, Northampton.

C. E. VIVIAN ROWE, Town Clerk.

NEW ZEALAND. NATIONAL HEALTH INSTITUTE OF NEW ZEALAND. Applications are invited from suitably qualified persons to fill a vacancy for an ASSISTANT DIRECTOR (microbiology) in the National Health Institute, Wellington, New Zealand. Commencing salary £1710 (N.Z.) p.a., rising by 1 increment of £100 and another of £50 to a maximum of £1860 (N.Z.) p.a. Applicants should be fully qualified and registered medical practitioners possessing a post-graduate Diploma in Medicine or Bacteriology. A wide experience of bacteriological methods and technique and in particular a knowledge of public-health bacteriology are also required. Experience in virus work is also desirable. The successful applicant should be able to participate in the research work which will be undertaken in the Laboratory. If necessary he will be given the opportunity of further short study before taking up duty in New Zealand.

Application forms, conditions of service, &c., may be obtained from High Commissioner for New Zealand, 415, Strand, London, W.C.2, mentioning this paper and quoting reference number 3/131. Completed applications are to be lodged not later than 5th December, 1952.

MONMOUTHSHIRE COUNTY COUNCIL. The Council invite applications from duly qualified medical practitioners for the appointments of ASSISTANT MEDICAL OFFICERS. Possession of the D.P.H. or similar qualification would be an advantage. The duties will mainly be the medical inspection and treatment of school-children and infant welfare work. The salary will be at the rate of £850 p.a. rising by increments of £50 to a maximum of £1150 p.a. The successful candidates will be required to act under the direct supervision of the County Medical Officer, to devote whole time to the work of the County Council, and to reside in such place as the County Council may determine. The posts will be subject to the provision of the National Health Service superannuation regulations, and to a satisfactory medical examination.

A schedule of duties to be performed, together with conditions of appointment and a form of application, can be obtained from the County Medical Officer, to whom application accompanied by copies of not more than 3 testimonials are to be sent by 24th November, 1952.

VERNON LAWRENCE, Clerk of the Council.

County Hall, Newport, Monmouthshire.

ROYAL ARMY MEDICAL CORPS. Short-service (Specialist) and REGULAR COMMISSIONS. The War Office invites applications from registered medical practitioners, Men and Women, for Short-service (Specialist) Commissions in the Royal Army Medical Corps for a period of 8 years, of which from 2 to 8 years are on the active list and the balance (if any) on the reserve. Extensions up to a maximum of 8 years on the active list are admissible. Commissions as Specialists are granted to doctors experienced in anæsthetics, army health, medicine, psychiatry, radiology, surgery, orthopædic surgery, and medicine. Civilian applicants should have been qualified for 7 years, have been engaged in whole-time practice of their specialty for 5 years, and should hold an appropriate higher qualification in their specialty. Released medical officers, including women, should have been classified during previous military service as specialists or should fulfil the requirements outlined above. They will after 3 months service be granted the temporary rank and the pay of major. Short-service Specialist Officers receive qualification pay and will on being granted the temporary rank of major, if single, receive total emoluments of approximately £1325 a year, or if married £1462 a year. Pay is increased by £55 a year on completion of 2 years in the temporary rank of major. Previous service on full pay, as a R.A.M.C. Medical Officer in the rank of major counts towards 3 increments of pay. Antedates of up to 2 years for civil experience in the hospital field may be given. Applicants appointed within 12 months of leaving superannuable employment as medical practitioners on the staff of an employing authority under the National Health Service may continue contributions during the active list period of their short-service commission and preserve their superannuation position. On satisfactory termination of active list service, officers not appointed to a regular commission are eligible for gratuities ranging from £450 for 3 years up to £1200 for 8 years active list service. Male Officers may apply for regular commissions on completion of 6 months as a Short-service Medical Officer. Previous full pay service as a R.A.M.C. Medical Officer counts towards seniority, increments of pay, promotion, and pension. Regular commissions are not available for women. Regular officers retire at ages varying from 53 to 60 years, the majority at 57 years of age. Rates of retired pay vary from £500 to £1200 a year, the majority getting £875 a year. Officers eligible for full retired pay qualify for a terminal grant up to £1000.

Further details may be obtained on application to the War Office (A.M.D. 1), Lansdowne House, Berkeley-square, London, W.1. Visits to the above address (Room 130) will be welcomed. (Telephone GROsvenor 8040, Extension 548.)

General Practice

For an Executive Council post apply on form E.C.16A obtainable from the council. Mark envelope "Vacancy."

GOOLE, YORKS. Applications are invited for Vacancy arising in the Borough of Goole. List at present approximately 3000. No residential or surgery accommodation available. Apply on Form E.C.16A to the undersigned not later than 15th November, 1952. C. H. STABLER, Clerk of the West Riding of Yorkshire Executive Council.

5 St. John's North, Wakefield.

Hospital Services : Non-Medical Appointments

LEICESTER ROYAL INFIRMARY. Applications are invited for the post of RADIOGRAPHER at the Regional Centre for Radiotherapy, at the above Hospital. Whitley Council salary and conditions.

Applications, together with the names of 3 referees, to the Secretary, Leicester No. 1 Hospital Management Committee, 38A, East Bond-street, Leicester.

Miscellaneous

To non-professional posts the Notification of Vacancies Order 1952 applies

For Sale. General Practice in town in S. Rhodesia. Book entries average £550 per month. Room for expansion. Owner wishes to specialise. Price £4500, terms can be arranged.—Address, No. 737, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

For Sale. Ophthalmic Practice in South Africa.—Details from : Messrs. GRIFFITHS, MCALISTER LTD., 10, Warwick-street, Regent-street, London, W.1.

Retiring vacancy, old established Private Practice. Large modern house available, better-class residential area in N.W. Suburb. Suitable Physician or Surgeon with consulting connections.—Address, No. 744, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Doctors needing secretaries should telephone the Medical Secretarial Service WEL. 0503.

Large first-floor consulting-room vacant. Use of ground-floor waiting-room. Near Marble Arch.—PAD. 0375 (9–10 A.M., 6–7 P.M.).

Off Grosvenor-square. Period House with licence for Doctor, from first-floor upwards. 11 rooms, 2 baths, kitchen. Perfect decoration and repair. Rental £1000 p.a., including h.c.w. and some service.—Tel. SLO. 3681 before 12 NOON.

Nursing-home. Established 30 years N.W. London. Fully equipped to accommodate 14 patients. Large annexe for staff. Reception rooms. Operating-theatre, &c. Price £10,500. —Address, No. 746, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Eminently suitable for Doctor or Dental Surgeon. Harley-street, W.1 (off). Exclusive double-fronted Queen Anne style building with good natural lighting Suitable for professional use, with modern self-contained flat, 2 beds, 1 reception, kitchen, bathroom, and W.C. Caretaker's flat, 2 rooms, kitchen, and bathroom, lease 50 years. Price £5500.—Address, No. 745, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Consulting-rooms, full and part time, and Houses in the medical area.—ELGOOD & Co., 1, Bentinck-street, W.1 (WELbeck 8974).

Birth-control Methods by Dr. Norman Haire, Ch.M., M.B., dealing extensively with all methods of contraception, abortion, and sterilisation, is intended for the medical practitioner and student, who can recommend it to patients with the assurance that this is a serious yet easily comprehensible treatment. *Illustrated with numerous plates and diagrams. 8th printing.* 9s. (post free). Publishers, ALLEN & UNWIN, 40, Museum-street, London, W.C.1.

For Sale. "Blood," The Journal of Hæmatology, 1946-50 : vols. I, II, III, IV complete; vol. V one missing. Special issue no. 1, 1947. £15, or offer.—Address, No. 747, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Applicants for posts requiring testimonials copied or duplicated should communicate with MANTON SECRETARIAL SERVICE, LTD., 98, Victoria-street, S.W.1 (Phone : VICtoria 0141), who are specialists in this kind of work.

" Pregnancy Diagnosis by the Xenopus Method." 24-hour service.—Send specimen of urine and £1 1s. fee to : WELBECK BIOLOGICAL LABORATORIES, 26, Park-crescent, Portland-place, W.1 (Telephone : MUSeum 5386–7).

Microscopes. Secondhand bargains, guaranteed sound order. Deferred terms if desired. Also highest prices paid for good modern types.—WALLACE HEATON LTD., 127, New Bond-street, W.1.

Genuine 17th Century Maps of every British County by Speed, Saxton, &c., &c. Exquisite colours. Absorbing detail.—FOLEY WHICKHAM, Antiques, 4, Royal Hotel Shops, Scarborough.

For Sale. " Perihel " ultra-violet lamp. As new, £25 or reasonable offer.—Address, No. 748, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

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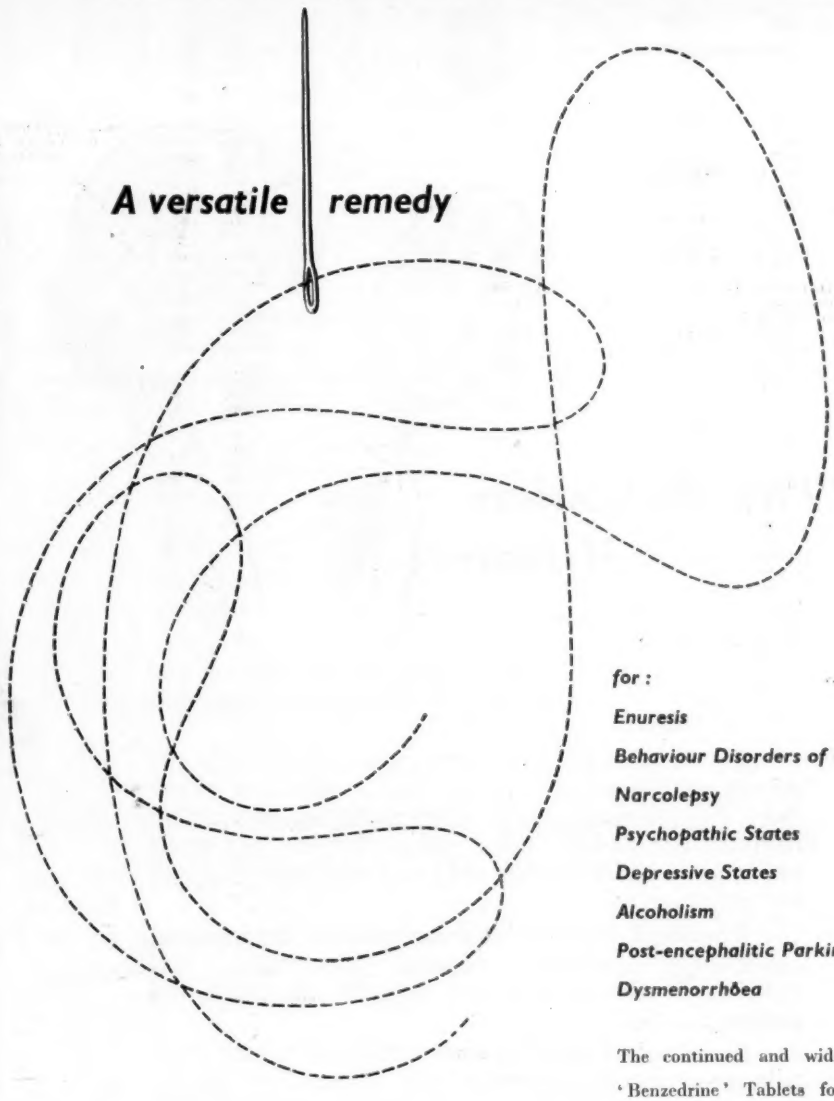

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